



Over the top: Three new species of terrestrial breeding frogs (Anura, Terrarana, *Pristimantis*) from the highlands of the Cordillera de Huancabamba, northwestern Peru

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Abstract

We describe three new species of *Pristimantis* frogs from northwestern Peru on the basis of morphological and genetic differences. *Pristimantis chinguelas* **sp. nov.** is similar in appearance to *P. wagteri* but it differs by having a longer supratympanic fold, head rounded in profile, groins and posterior surfaces of thighs in a different color pattern. *Pristimantis nunezcortez* **sp. nov.** may be confused with *P. cryptomelas*, but it is differentiable by having heels with a single low tubercle, skin on flanks areolate, and by lacking prominent postorbital ridges. *Pristimantis yonke* **sp. nov.** is externally similar to *P. morlaco* from Ecuador, but can be distinguished by being smaller, having an acuminate snout, oval palmar tubercle and lacking dentigerous processes of vomers. All species inhabit the paramos and adjacent elfin forests of the mountain ridges north of Abra de Porcuya, the lowest east-west pass in the Peruvian Andes. Despite habitat loss being evident in the area, we do not have enough data to assess their conservation status. We suggest all the new species should be placed in the Data Deficient category of the IUCN Red List.

Key Words

Elfin forests, new species, north, paramos, Peruvian Andes, *Pristimantis*

Introduction

The Cordillera de Huancabamba, located in northwestern Peru, is characterized by rugged topography and crests that do not exceed 4000 m in elevation (Weigend 2002; Reynel et al. 2013; Peters et al. 2014). The ridges in these mountains are steep, exposed, their soil is loose and muddy on the flat sections, and the weather can be very changeable

(Brack 1986). This is likely why since the early 90's, only a few herpetologists have reached this region (Duellman and Wild 1993; Lehr et al. 2007; Venegas et al. 2008; Coloma et al. 2010; Venegas and García-Ayachi 2024). Their expeditions resulted in the record of twenty nine species, fourteen of which (nearly 50%) are endemic. Notably, some of these species have not been spotted since their description (i.e. *Telmatobius ignavus*) or have been observed only recently after

disappearing for many years (i.e. *Atelopus eusebiodiazi*, Germán Chávez unpublished data). South of the Cordillera de Huancabamba lies one of the lowest passes in the Andes: The Abra de Porculla, at 2145 m a.s.l. This feature provides a dispersal pathway for organisms from the Amazon region westward to the Pacific lowlands and vice versa (Gentry 1977; O'Neill 1992), while also acting as a distributional barrier in the north-south direction due to the depression disrupting the continuity of the mountain range (Young and Reynel 1997; Lehr et al. 2007). Together, these facts underscore that the Cordillera de Huancabamba is home to many unique amphibian species (Duellman and Wild 1993; Lehr et al. 2007; Venegas et al. 2008; Coloma et al. 2010).

With 619 species described to date, the frog genus *Pristimantis* Jiménez de la Espada 1870, is the most diverse group of amphibians (AmphibiaWeb 2025), distributed in Central and South America, and reaching its greatest diversity in the tropical Andes of Colombia, Ecuador and Peru (Duellman and Lehr 2009; Frost 2025). The taxonomy of *Pristimantis* is complex due to its extensive diversity and high morphological variation. Recent studies indicate that the species richness of *Pristimantis* is underestimated and that several cryptic species or species complexes may be hidden within taxa with wide geographic distributions (Elmer and Cannatella 2008; Padial and De La Riva 2009; Hutter and Guayasamin 2015; Ortega-Andrade et al. 2015; Páez and Ron 2019). An integrative approach (e.g. including morphological and genetic studies) is critical to propose well-supported inferences on the taxonomy of these frogs (Hedges et al. 2008; Padial et al. 2014).

Concerning *Pristimantis* frogs in the Cordillera de Huancabamba, Duellman and Wild (1993) described four new species of *Pristimantis*, Lehr and Duellman (2007) discovered a minute species of *Pristimantis*, and Lehr et al. (2007) described three new species of *Pristimantis*, all of them from this region. Although

previous research studies have explored several areas of this region, large parts of the Cordillera de Huancabamba remain unexplored.

As a result of a series of short expeditions to some of those unexplored areas, we obtained a small collection of *Pristimantis* frogs. After morphological revisions and genetic analyses, we concluded that three taxa in this collection represent new species to science. These species as well as the results of our genetic and morphological analyses are described herein.

Methods

Fieldwork

We sampled at four sites in the Cordillera de Huancabamba, northwestern Peru (Fig. 1). We conducted nocturnal Visual Encounter Surveys (Crump and Scott Jr 1994), typically walking 5–6 hours per night during rainy season (2021, 2023) and dry season (2023, 2024). Surveys were systematically carried out by four researchers across key habitats, including elfin forest patches and páramo ecosystems. Active searches were performed by carefully scanning the ground, vegetation, and water edges using headlamps to detect amphibians. Each survey was focused on multiple different microhabitats to ensure comprehensive coverage, with particular attention to riparian zones, streams and moist areas.

Morphology

We follow Lynch and Duellman (1997) and Páez and Ron (2019) for the format of diagnosis and description of the new species. For systematics of Strabomantidae we follow

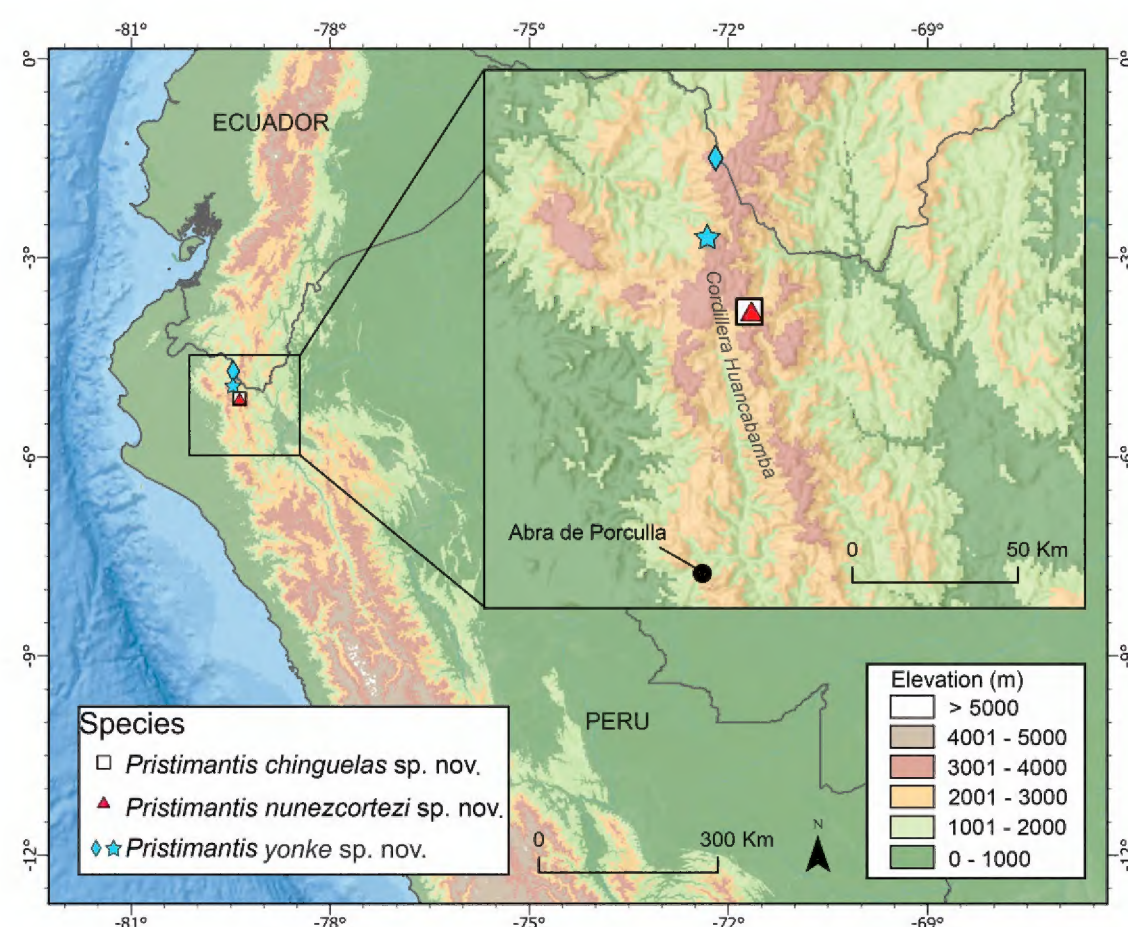


Figure 1. Map showing localities of distribution of the *Pristimantis* species described herein. White square = *P. chinguelas* type locality, red triangle = *P. nunezcortezii* type locality, blue star = *P. yonke* type locality and blue rombo = second known locality for *P. yonke*.

Hedges et al. (2008); Blackburn and Wake (2011) and Padial et al. (2014). Terminology of morphological characters follows Duellman and Lehr (2009). We euthanized specimens with an 8% benzocaine solution, fixed them in 10% formalin, and stored them in 70% ethanol. We deposited all specimens in the herpetological collection of Centro de Ornitología y Biodiversidad (**CORBIDI**). The Servicio Nacional Forestal y de Fauna Silvestre de Peru issued the collecting permit RJ N° 003-2014-SERFOR-RCS-JEF029-2016-SERFORDGGSPFFS. We measured the following variables to the nearest 0.1 mm with digital callipers under a stereoscope, as described in Duellman and Lehr (2009): snout–vent length (**SVL**); eye–nostril distance (**E–N**); head length (**HL**); head width (**HW**); interorbital distance (**IOD**); internarial distance (**IND**); tibia length (**TL**); hand length (**HaL**); foot length (**FL**); eye diameter (**ED**); tympanum diameter (**TD**); upper eyelid width (**EW**). Fingers and toes are numbered preaxially to postaxially from I–IV and I–V respectively. We determined comparative lengths of toes III and V by adpressing both toes against Toe IV; lengths of fingers I and II were determined by adpressing the fingers against each other. All measurements are given in Table 1. Specimens were sexed based on external sexual characteristics (e.g., presence of vocal sacs in males). Reproductive condition was determined by life stages: adult, subadult and juvenile. Photographs were taken in the field by GC, and in the laboratory by LAGA. We used these photos for descriptions of coloration in life and in preserved condition, respectively. For comparisons, we examined specimens of *Pristimantis wagteri* from the type locality (CORBIDI 11017, 11021), and obtained morphological data for diagnostic comparisons from Lynch (1975, 1979), Lynch and Duellman (1980), Duellman and Wild (1993), Duellman and Pramuk (1999), Duellman and Hedges (2007), Duellman and Lehr

(2009), Páez and Ron (2019), Székely et al. (2020), Ortega et al. (2022), and Sánchez-Nivicela et al. (2022).

Bioacoustics

We recorded the advertisement call of one of the new species by using a Marantz PMD660 digital recorder and a Sennheiser ME64 shotgun microphone. All recordings were performed during night surveys at 13 °C, and at a distance of 0.5 m from the call emitter. We measured the following variables using a note-centered approach (as defined by Köhler et al. 2017; Araya-Salas and Smith-Vidaurre 2017): number of notes per call, number of harmonics, note length (**NL**), mean dominant frequency (**DoF**, which also corresponds to the fundamental frequency in this species; taken with a spectral slice over the entire note), delta frequency (**DeF**) (difference in dominant frequency at the start and end of the note), inter-note length (interval between the end of one note and the beginning of the next one; is the same as inter-call length for one note calls), inter-call length (interval between the end of one call and the beginning of the next one), and second harmonic frequency. We measured temporal call variables on oscillograms using Raven Lite v2.0.5 (K. Lisa Yang Center for Conservation Bioacoustics 2024), frequency data using package warbleR (Araya-Salas and Smith-Vidaurre 2017), and visualized the spectrogram using package seewave (Sueur et al. 2008) with a hanning window, 0% overlap, and window length of 512 in R v4.3.3 (R Core Team 2024). For all parameters except inter-call length, we used the average calculated across four calls of each of the three recordings. Recordings are of separate individuals that are discernible in each recording. For inter-call length, we used recordings where we could

Table 1. Measurements variation and proportions in the type series of *Pristimantis chinguelas*, *P. nunezcortez*i, and *P. yonke*. Mean and standard deviation are in parenthesis.

	<i>Pristimantis chinguelas</i> sp. nov.	<i>Pristimantis nunezcortez</i> i sp. nov.	<i>Pristimantis yonke</i> sp. nov.	
	Males (n = 9)	Males (n = 2)	Males (n = 4)	Females (n = 2)
SVL	25.4–34.9 (33.6 ± 1.8)	31.7–38.0 (34.8 ± 4.4)	19.3–20.1 (19.6 ± 0.3)	25.4–34.9 (33.6 ± 1.8)
HL	10.1–12.6 (12.5 ± 0.2)	12.3–14.2 (13.2 ± 1.3)	6.9–7.4 (7.2 ± 0.2)	10.1–12.6 (12.5 ± 0.2)
HW	10.5–13.6 (13.1 ± 0.4)	13.6–15.7 (14.6 ± 1.4)	7.5–7.9 (7.7 ± 0.1)	10.5–13.6 (13.1 ± 0.4)
ED	3.5–5 (4.8 ± 0.2)	3.5–4.2 (3.8 ± 0.4)	2.6–2.6 (2.6 ± 0)	3.5–5 (4.8 ± 0.2)
TD	1–2.1 (2 ± 0.1)	1.2–2 (1.6 ± 0.5)	1.2–1.2 (1.2 ± 0)	1–2.1 (2 ± 0.1)
IOD	3–3.8 (3.7 ± 0)	5–5.5 (5.2 ± 0.4)	2.5–2.6 (2.5 ± 0)	3–3.8 (3.7 ± 0)
UEW	2–2.9 (2.8 ± 0.1)	2.3–2.9 (2.6 ± 0.3)	1.8–1.9 (1.8 ± 0)	2–2.9 (2.8 ± 0.1)
E–N	2.5–4 (3.8 ± 0.3)	4–4.9 (4.5 ± 0.5)	2.1–2.4 (2.3 ± 0.1)	2.5–4 (3.8 ± 0.3)
IND	2–2.8 (2.6 ± 0.1)	2–3.1 (2.6 ± 0.8)	1.4–1.5 (1.4 ± 0)	2–2.8 (2.6 ± 0.1)
HaL	6.7–11.1 (10.8 ± 0.3)	9.7–12.8 (11.2 ± 2.1)	5.1–5.3 (5.2 ± 0)	6.7–11.1 (10.8 ± 0.3)
FL	12.5–17.1 (16.9 ± 0.1)	20.7–16.7 (18.7 ± 2.8)	7.9–8.6 (8.3 ± 0.3)	12.5–17.1 (16.9 ± 0.1)
TL	14.8–18.5 (18.1 ± 0.3)	18.4–21.8 (20.1 ± 2.4)	9.4–10.2 (10 ± 0.4)	14.8–18.5 (18.1 ± 0.3)
TL/SVL	0.5–0.5 (0.5 ± 0)	0.5–0.5 (0.5 ± 0)	0.5–0.5 (0.5 ± 0)	0.4–0.5 (0.5 ± 0)
FL/SVL	0.4–0.5 (0.5 ± 0)	0.5–0.5 (0.5 ± 0)	0.4–0.4 (0.4 ± 0)	0.4–0.5 (0.5 ± 0)
HL/SVL	0.3–0.3 (0.3 ± 0)	0.3–0.3 (0.3 ± 0)	0.3–0.3 (0.3 ± 0)	0.3–0.3 (0.3 ± 0)
HW/SVL	0.3–0.4 (0.3 ± 0)	0.4–0.4 (0.4 ± 0)	0.1–0.4 (0.3 ± 0.1)	0.3–0.4 (0.3 ± 0)
HW/HL	1–1.1 (1 ± 0)	1.1–1.1 (1.1 ± 0)	0.9–1 (1 ± 0)	1–1.1 (1 ± 0)
E–N/ED	0.7–0.8 (0.7 ± 0)	1.1–1.1 (1.1 ± 0)	0.8–0.9 (0.8 ± 0)	0.7–0.8 (0.7 ± 0)
UEW/IOD	0.6–0.7 (0.7 ± 0)	0.4–0.5 (0.5 ± 0)	0.6–0.7 (0.7 ± 0)	0.6–0.7 (0.7 ± 0)
TD/ED	0.2–0.4 (0.4 ± 0)	0.3–0.4 (0.4 ± 0)	0.4–0.4 (0.4 ± 0)	0.2–0.4 (0.4 ± 0)

measure multiple calls from one single individual with confidence. Acoustic files may be accessed through Zenodo website (<https://doi.org/10.5281/zenodo.15650148>).

Molecular genetics

We performed phylogenetic analyses on a fragment of the mitochondrial gene 16S rRNA to examine relationships with the most closely related species. Using a mitochondrial phylogeny limited to a single gene is not optimal, but 16S rRNA is the only gene with best coverage among *Pristimantis* species, on the basis of sequences available in Genbank. Given the high species richness of the genus, we prioritised maximizing species overlap for our phylogeny. We extracted DNA from muscle tissues of the specimens CORBIDI 26764, 26771–72, 26785–86, 26402, and CORBIDI 26929 belonging to the type series of the three species described in this work by using a commercial extraction kit (IBI Scientific, Peosta, USA). We followed standard protocols for amplification and sequencing of DNA (Hedges et al. 2008; Catenazzi and Tito 2016). We used the 16Sar forward (5'-3' sequence: CGCCTGTTTATCAAAAACAT) and 16Sbr reverse (5'-3' sequence: CCGGTCTGAACTCAGATCACGT) universal primers for 16S (Palumbi et al. 2002; von May et al. 2017) expecting a range of 550–600 pb. We used the following thermocycling conditions during the polymerase chain reaction (PCR) with a ProFlex thermal cycler (Applied Biosystems): one cycle of 96 °C/3 min; 35 cycles of 95 °C/30 s, 55 °C/45 s (Tm), 72 °C/1.5 min; one cycle 72 °C/7 min. We purified PCR products with Exosap-IT (Affymetrix, Santa Clara, CA) and shipped the purified products to MCLAB (San Francisco, CA) for sequencing. Newly generated sequences were deposited in GenBank (Suppl. material 1).

We downloaded sequences of closely related species (from BLAST results) or morphologically similar, congeneric species and the species *Noblella usurpator*, *Oreobates amarakaeri*, and *Strabomantis bufoniformis* (used as outgroup taxa) from GenBank. We used Geneious R11, version 11.1.5 (Biomatters, <http://www.geneious.com/>) to assemble pair-end reads, to generate a consensus sequence, and to align our novel and GenBank sequences withing Geneious using MAFFT v7.017 and default parameters (Katoh and Standley 2013). We trimmed aligned sequences to a length of 611 bp. Our analysis included 108 terminals.

We inferred phylogenetic relationships with Maximum Likelihood (ML) inference. We conducted the analysis with IQ-TREE v1.6.12 (Nguyen et al. 2015) using our alignment, a substitution model determined by ModelFinder on the IQ-TREE web server, branch support using the ultrafast bootstrap (UFBoot) described in Minh et al. (2013; 10000 bootstrap alignments), and the SH-aLRT branch test for single branch support (Guindon et al. 2010; 1000 replicates). ModelFinder tested 88 models and selected the TIM2+F+I+G4 as the best model on the basis of all three criteria considered (Akaike Information, Corrected Akaike, and Bayesian Information). The log-likelihood of the consensus tree was -9704.38 (SE 508.46)

We also estimated genetic distances for the 16S rRNA mitochondrial fragment to provide further support of species delimitation. While there is no universally agreed-upon threshold for what constitutes a distinct species based on 16S rRNA distance, Fouquet et al. (2007) suggested that a distance of 3% or more is a good indicator of a new species. Among other reasons, Fouquet et al. (2017) supported this statement on the predominance of distances between 3%–6% among allopatric species distributed in the Guianas and other regions of South America. This also agrees with the genetic distance (based on mitochondrial DNA) found in well-sampled datasets, where Fouquet et al. (2017) found that most of the species below 3% distances deserved to be synonymised. The advantage of using 16S rRNA is that it is the most commonly sequenced genetic marker for classifying frogs (Vences et al. 2005; Fouquet et al. 2007; Padial et al. 2009). We calculated the uncorrected p-distances (the percentage of nucleotide sites that differ between two sequences) using MEGA v12 (Kumar et al. 2024), and uploaded the data to Figshare (<https://doi.org/10.6084/m9.figshare.28326707>).

Nomenclatural act

The electronic version of this article in portable document format will represent a published work according to the International Commission on Zoological Nomenclature (ICZN), and hence the new names contained in the electronic version are published under that Code from the electronic edition alone. This published work and the nomenclatural acts it contains have been registered in ZooBank, the online registration system for the ICZN. The ZooBank LSIDs (Life Science Identifiers) and the associated information can be viewed through any standard web browser at <http://zoobank.org/References/02FC2857-6A31-4305-A5DB-A6C7E7A4CD6E>.

Results

Generic placement

The phylogenetic relationships inferred with Maximum Likelihood (ML) were generally congruent with those of Páez and Ron (2019) and Ortega et al. (2022). As a consequence of using a single mitochondrial gen (16S), some nodes show low support. Nevertheless, none of them affect the phylogenetic position of the three new species presented herein against their related congeners. We placed *P. chinguelas* sp. nov. in the genus *Pristimantis* sensu Hedges et al. (2008); Duellman and Lehr (2009) and Padial et al. (2014) based on the general morphological similarity to other members (e.g. characteristic terminal discs on fingers and toes expanded, toes without membranes, and Toe V longer than Toe III) and phylogenetic relationships (Fig. 2). Furthermore, according to our phylogeny (Fig. 2), the new species is nested in a clade with species of the *P. phoxocephalus* group, currently assigned to the

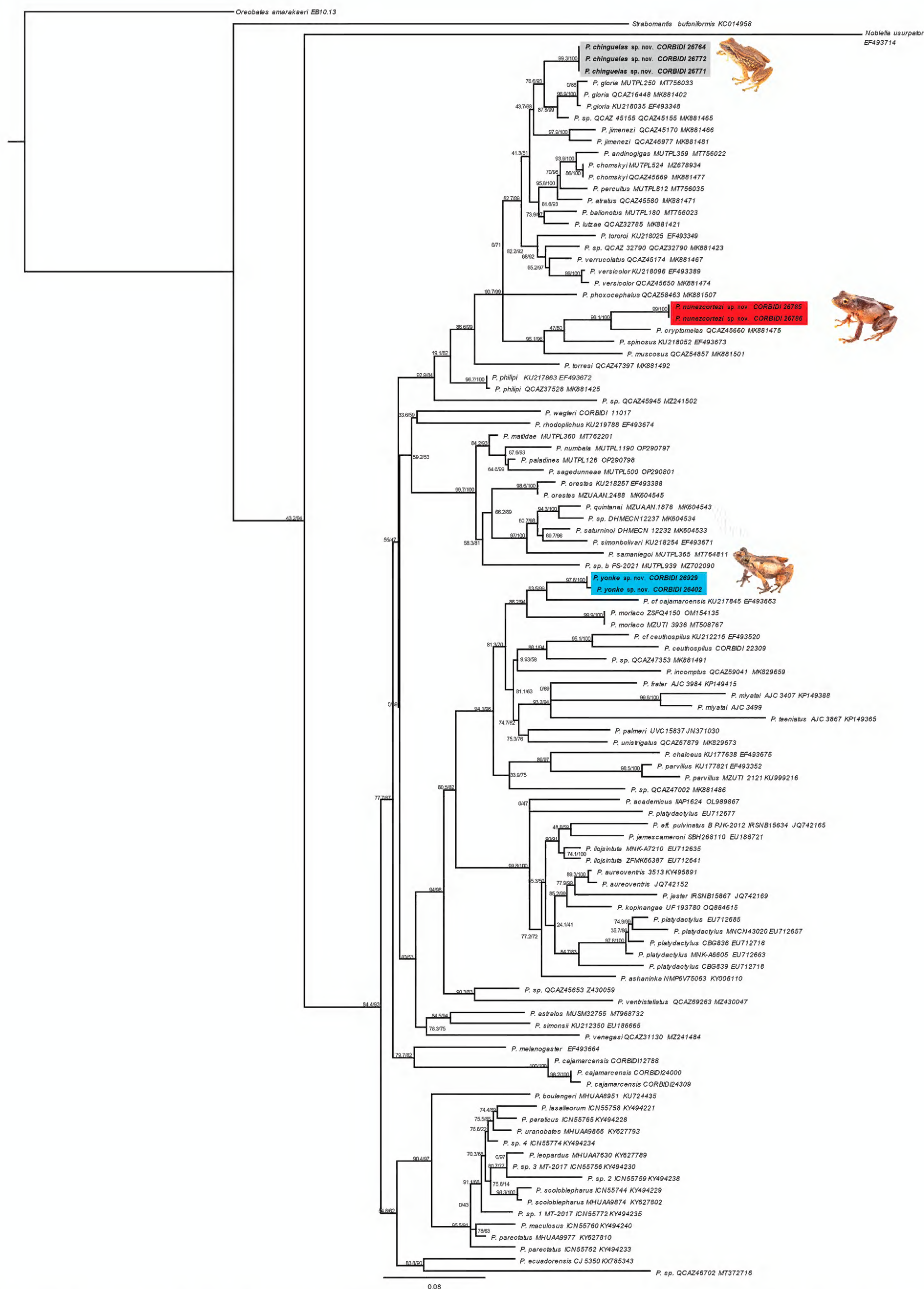


Figure 2. Maximum Likelihood consensus tree for the three new species of *Pristimantis* from Peru (in bold), related species of *Pristimantis*, and three outgroup terminals (*Noblella usurpator*, *Oreobates amarakaeri*, *Strabomantis bufoniformis*) included in this study based on a 611-bp fragment of the 16S rRNA gene in IQ-TREE (branch support for SH-aLRT/Ultrafast indicated at each node). Consensus tree was constructed from 10000 bootstrap trees (log-likelihood of consensus tree: -9704.38, SE 508.46). Branch lengths are optimized by maximum likelihood on original alignment.

subgenus *Huicundomantis* (sensu Páez and Ron 2019; Ortega et al. 2022). *Pristimantis chinguelas* is most closely related to a subclade formed by *P. gloria* Páez and Ron 2019, and an undescribed species, both of them from Ecuador. The topology for the sampled *Pristimantis* includes nodes with moderate to strong support (bootstrap confidence values = 87.8%–99.3%). Genetic distances (p-distances) exceed 3% between *P. chinguelas* and all the other *Pristimantis* included in the analysis, but the p-distance is lowest against species within its sister clade: *P. gloria* (3.2%) and an undescribed species QCAZ45155 (3.1%).

We allocate *P. nunezcortezii* sp. nov. in the genus *Pristimantis* sensu Hedges et al. (2008); Duellman and Lehr (2009) and Padial et al. (2014) due to its morphological features (e.g. characteristic terminal discs on fingers and toes expanded, toes without membranes, and Toe V longer than Toe III) and phylogenetic relationships (Fig. 2). Furthermore, according to our phylogeny (Fig. 2), the new species is nested in the *P. cryptomelas* species group sensu Páez and Ron 2019 including *P. cryptomelas*, *P. spinosus*, and *P. muscosus*, within the subgenus *Huicundomantis* (sensu Páez and Ron 2019; Ortega et al. 2022). The topology for the sampled *Pristimantis* includes nodes with low to strong support (bootstrap confidence values = 47%–99%). We found substantial genetic distances exceeding 4% between *P. nunezcortezii* and all sequenced *Pristimantis*; the smallest p-distances were for two species within its sister clade: *P. cryptomelas* (4.5%) and *P. spinosus* (6.5%) and for *P. phoxocephalus* (5.3%), the latter is a species included in the same subgenus (*Huicundomantis*).

Finally, we placed *Pristimantis yonke* sp. nov. in the genus *Pristimantis* sensu Hedges et al. (2008); Duellman and Lehr (2009) and Padial et al. (2014) based on the general morphological similarity to other members (e.g. characteristic terminal discs on fingers and toes expanded, toes without membranes, and Toe V longer than Toe III) and its phylogenetic relationships (Fig. 2). According to our phylogeny (Fig. 2), the new species is nested in a subclade that includes members of the *Pristimantis unistrigatus* group sensu Hedges et al. (2008), Duellman and Lehr (2009) and Padial et al. (2014) which includes nodes with moderate to strong support (bootstrap confidence values = 83%–99%). The new species is the sister taxon of *P. cf. cajamarcensis* and *P. morlaco*, both samples from Ecuador. We found substantial genetic distances (exceeding 5%) between *P. yonke* sp. nov. and all sequenced *Pristimantis*; the specimens with the lowest p-distances were specimens of *P. morlaco* (5.4–5.8%) and *P. cf. cajamarcensis* (5.8–6.2%), the two most closely related species on the basis of our phylogeny.

Taxonomy

Pristimantis chinguelas sp. nov.

<https://zoobank.org/E9B6F26B-8CEB-400F-852A-9DF2C69775FF>

Type material. *Holotype* • Adult male CORBIDI 26772 (Figs 3A–D, 4A–E), from Cerro Chinguelas,

Huancabamba Province, Piura Region, Peru (5°7'32.59"S, 79°22'23.55"W; 2849 m a.s.l.), collected on 10 November 2023 by Wilmar Aznaran, Karen Y. Victoriano-Cigüeñas, Ivan Wong and Germán Chávez.

Paratypes • Adult males CORBIDI 26764–69, 26771, 26773 (Fig. 5), same data as holotype.

Diagnosis. We placed *Pristimantis chinguelas* sp. nov. in the genus *Pristimantis* sensu Hedges et al. (2008); Duellman and Lehr (2009) and Padial et al. (2014), subgenus *Huicundomantis* (sensu Ortega et al. 2022). *Pristimantis chinguelas* sp. nov. is a medium-sized species distinguished by the following combination of traits: (1) skin on dorsum shagreen without crests or ridges on scapular region, having enlarged dorsolateral tubercles; skin on venter areolate; discoidal fold weak; thoracic fold absent; flanks bearing a row of enlarged tubercles surrounded by numerous large rounded tubercles; (2) tympanic membrane absent, tympanic annulus present, its length about 40% of the length of eye; supratympanic fold prominent going from the posterior edge of upper eyelid to the level of the insertion of forelimbs; (3) snout short, subacuminate in dorsal view, rounded in profile; canthus rostralis angular; (4) upper eyelid lacking tubercles, about 70% IOD in males, females unknown; cranial crests absent; (5) dentigerous processes of vomers absent; (6) males with a subgular vocal sac and vocal slits; (7) Finger I slightly shorter than Finger II; discs on fingers broadly expanded, elliptical; (8) fingers lacking lateral fringes; (9) ulnar tubercles absent; (10) heel and tarsus lacking conical tubercles, only low rounded tubercles present; (11) inner metatarsal tubercle elliptical, elevated, about 3 times the size of round outer metatarsal tubercle; supernumerary tubercles low; (12) toes with lateral fringes; basal webbing on feet; Toe V longer than Toe III (disc on Toe III reaches distal edge of the penultimate subarticular tubercle on Toe IV, disc on Toe V reaches the middle to distal edge of the distal subarticular tubercle on Toe IV); (13) in life, dorsum buff yellow to chestnut brown; head having dark supratympanic and canthal stripes; groins, axillae and posterior surface of thighs yellow to dark brown with minute dark flecks; venter cream to yellow with dark flecks; iris gold with fine black reticulations (Fig. 3); (14) average SVL in adult males: 31.0 ± 3.1 mm (25.4–34.9 mm; $n = 9$); females: unknown.

Comparisons. *Pristimantis chinguelas* sp. nov. may be differentiated from the rest of congeners by the presence of enlarged dorsolateral tubercles and one parallel row of enlarged tubercles on flanks. There is only one species having enlarged tubercles forming rows on flanks: *Pristimantis wagteri* Venegas 2007. Nevertheless, *P. chinguelas* is distinguishable by having a larger supratympanic fold going from the upper eyelid to the insertion of the forelimbs (vs supratympanic fold going from the posterior edge of the eye to the level of the forelimbs), head rounded from lateral view (vs inclined posteroventrally), groins lacking spots or blotches (vs red or orange spots present on groins) and posterior surface of thighs brown or yellow with dark flecks (vs red or orange). Additionally, *P. wagteri* is a species inhabiting the eastern Andes,

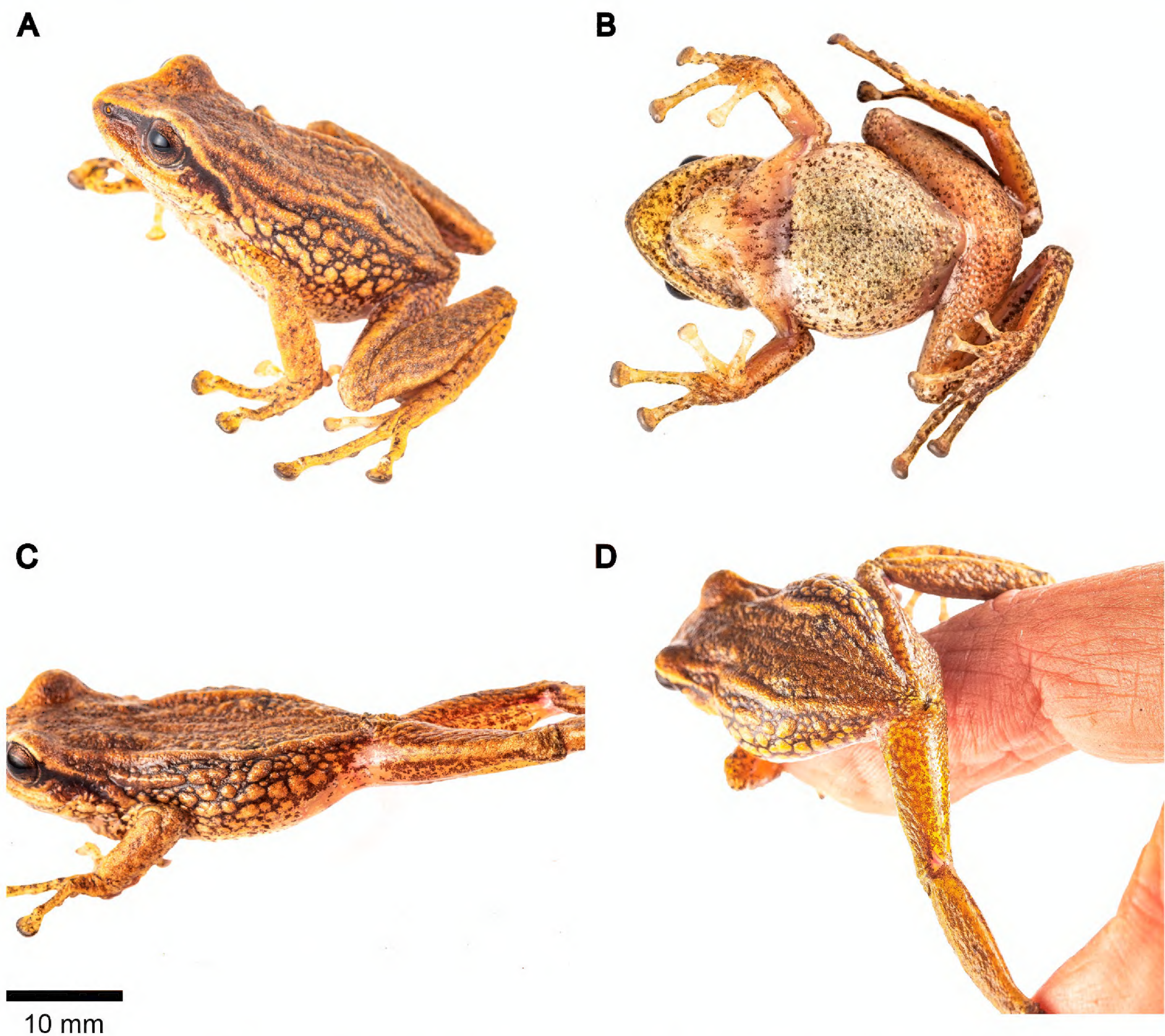


Figure 3. Dorsolateral (A), ventral (B), lateral (C), and posterior (D) view of the holotype (CORBIDI 26772) of *Pristimantis chinguelas* sp. nov. in life.

about 300 km south from *P. chinguelas*' type locality. One more species has enlarged tubercles on flanks but without forming rows: *Pristimantis verrucolatus* Páez and Ron 2019, however this species lacks enlarged dorsolateral tubercles (vs present in *P. chinguelas*), has snout protruding in profile with a fleshy keel on the tip (vs rounded, without keel in *P. chinguelas*), upper eyelid with several low rounded tubercles (vs tubercles absent on upper eyelid in *P. chinguelas*), and a short supratympanic fold (vs large, going from the upper eyelid to the level of the insertion of forelimbs in *P. chinguelas*). Among other species having complete, large dorsolateral tubercles or folds, *P. chinguelas* is distinguishable by having toe V longer than toe III (vs slightly longer in *P. adiasolus*, *P. albertus*, *P. avicuporum*, *P. buccinator*, *P. condor*, *P. conspicillatus*, *P. lanthanites*, *P. meridionalis*, *P. peruvianus*, *P. rhabdolaemus*, *P. skydmainos*, *P. stictogaster*, *P. tanyrhynchus*, and *P. toftae*; much longer in *P. saggitulus*); snout short (vs long in *P. adiasolus*, *P. albertus*, *P. avicuporum*, *P. buccinator*, *P. condor*, *P. conspicillatus*, *P. lanthanites*, *P. meridionalis*, *P. peruvianus*, *P. rhabdolaemus*,

P. skydmainos, *P. stictogaster*, *P. tanyrhynchus*, and *P. toftae* and *P. saggitulus*); upper eyelid lacking tubercles (vs present in *P. atratus*); skin on venter areolate (vs smooth in *P. adiasolus*, *P. albertus*, *P. avicuporum*, *P. buccinator*, *P. condor*, *P. conspicillatus*, *P. lanthanites*, *P. meridionalis*, *P. peruvianus*, *P. skydmainos*, and *P. tanyrhynchus*); lacking conical tubercles on heels (vs present in *P. atratus*); and lacking chevron or stripes pattern on dorsum (vs chevrons present in *P. adiasolus*, *P. albertus*, *P. avicuporum*, *P. buccinator*, *P. condor*, *P. conspicillatus*, *P. meridionalis*, *P. peruvianus*, *P. rhabdolaemus*, *P. stictogaster*, *P. tanyrhynchus*, and *P. toftae*; stripes present in *P. atratus* and *P. saggitulus*). Moreover, *P. chinguelas* is closely related to *P. gloria*, a species inhabiting the eastern Ecuadorian Andes nearly 200 km north from *P. chinguelas*' type locality, but can be mainly distinguished by having a bronze iris with fine black reticulations (vs iris cream with thick black reticulations), dorsum with large prominent dorsolateral tubercles (vs absent) and the absence of vomerine teeth (vs present in). Also, the presence of enlarged dorsolateral tubercles and the absence of vomerine teeth

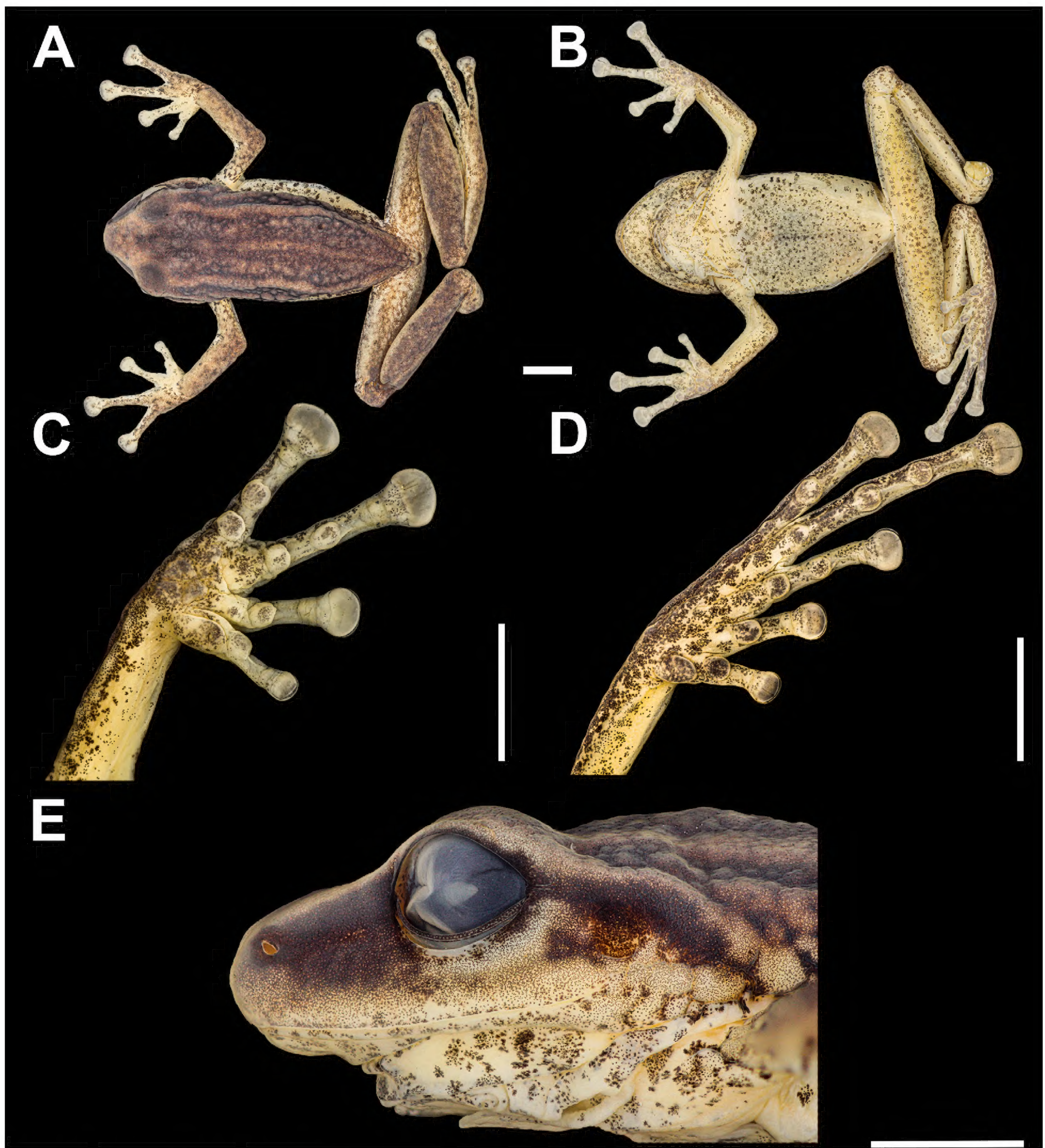


Figure 4. Holotype of *Pristimantis chinguelas* sp. nov. in preservative (CORBIDI 26772). **A.** Dorsal; **B.** Ventral view of the body; **C.** Ventral view of the right hand, **D.** Ventral view of the right foot, **E.** Lateral view of the head. Scale bars: 5 mm.

distinguish *P. chinguelas* from a genetically related undescribed species (QCAZ 45155).

Description of the holotype. An adult male (CORBIDI 26772). Measurements (in mm): SVL 34.9; TL 18.5; FL 17.1; HL 12.6; HW 13.6; ED 4.9; TD 2.1; IOD 3.8; EW 2.9; IND 2.8; EN 3.9; FeL 15.9. Head wider than long, narrower than body; snout subacuminate in dorsal view, rounded in profile, lacking papilla or flaps on the tip of the snout (Fig. 4E); cranial crests absent; nostrils slightly protuberant, directed anterolaterally; canthus rostralis slightly concave in dorsal view, rounded in cross section; loreal region concave; upper eyelid

lacking tubercles; tympanic annulus present, visible through the skin, its upper and posterolateral edge concealed by thick, prominent supratympanic fold; tympanic membrane not visible; postrictal tubercles absent. Choanae median, ovoid, non-concealed by palatal shelf of maxilla; dentigerous processes of vomers absent; tongue slightly longer than wide, not notched, posterior half free; vocal slits slightly curved, positioned at posterior half of mouth floor in between tongue and margin of jaw; medium sized vocal sac. Dorsal surfaces of body shagreen; dorsolateral enlarged tubercles present, going from the posterior edge of the upper eyelid to the groin;

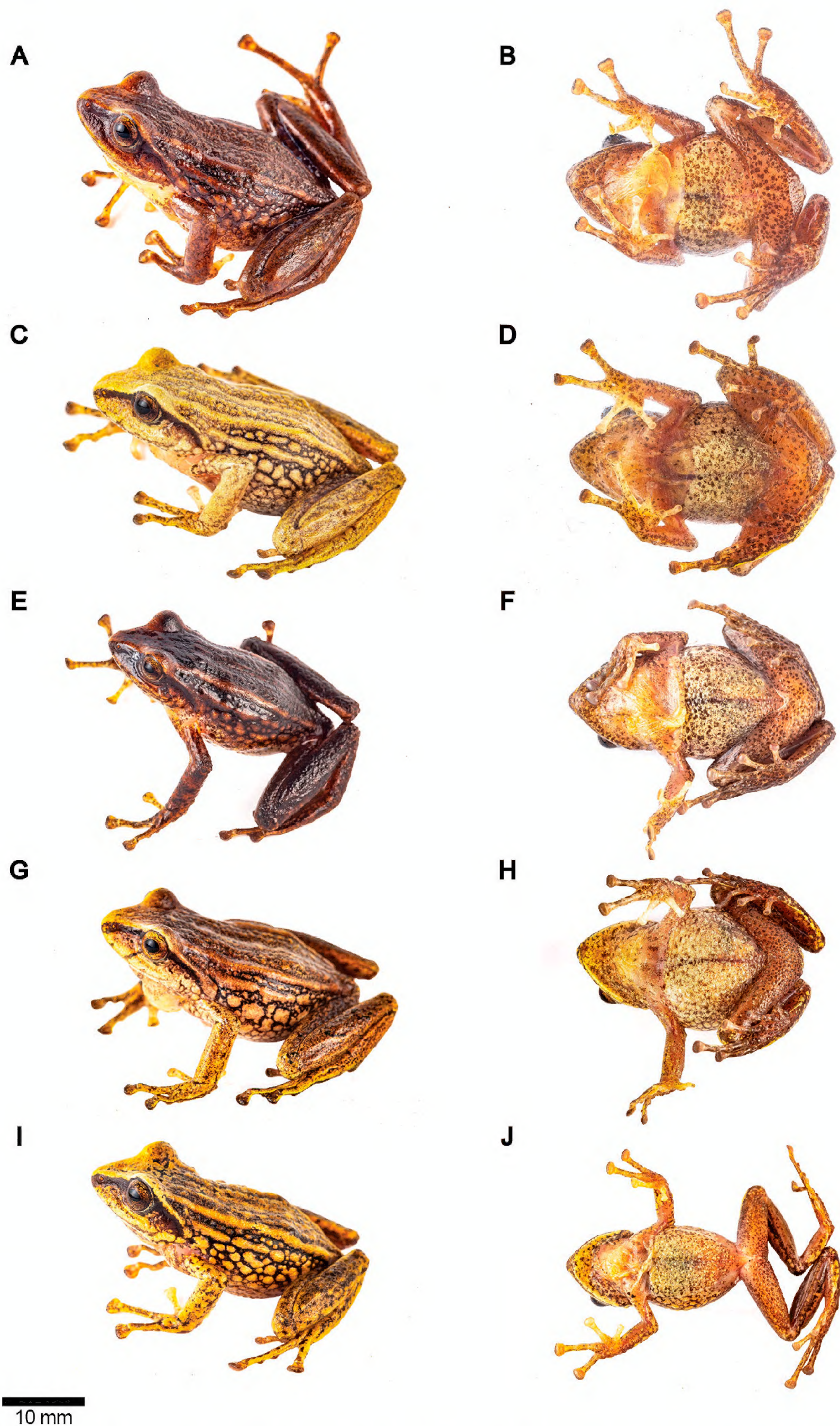


Figure 5. Coloration in life of *Pristimantis chinguelas* male paratypes. A, B. CORBIDI 26764; C, D. CORBIDI 26765; E, F. CORBIDI 26766; G, H. CORBIDI 26768; I, J. CORBIDI 26771.

skin on flanks bearing a row of enlarged tubercles going parallel to the dorsolateral tubercle, below numerous enlarged tubercles cover the rest of the flank; skin on chest and belly areolate, that on throat shagreen, ventral surfaces of limbs smooth, ventral surfaces of thighs coarsely areolate; discoidal fold present, thoracic fold absent. Ulnar tubercles absent; nuptial pads absent; outer palmar tubercle bifid low, as large as ovoid thenar tubercle; subarticular tubercles low, rounded; large supernumerary tubercles at base of fingers, distinct; fingers bearing lateral fringes; Finger I shorter than Finger II; discs on fingers expanded and rounded; pads on fingers surrounded by circumferential grooves on all fingers (Fig. 4C). Hindlimbs slender; dorsal surfaces of hindlimbs shagreen; posterior surfaces of thighs smooth, ventral surfaces of thighs coarsely areolate; heel lacking tubercle; outer and inner edge of tarsus lacking tubercles; inner metatarsal tubercle elliptical, elevated, twice the size of oval outer metatarsal tubercle; plantar surface with small, low and rounded supernumerary tubercles; subarticular tubercles prominent, rounded; toes bearing lateral fringes; basal webbing between toes III and IV, and IV and V; discs on toes smaller than those on fingers, expanded and rounded; all toes having pads surrounded by circumferential grooves; relative lengths of toes: $I < II < III < V < IV$; Toe V longer than Toe III (disc on Toe III reaches the distal edge of penultimate subarticular tubercle on Toe IV, disc on Toe V reaches the distal edge of distal subarticular tubercle on Toe IV; Fig. 4D).

Coloration of holotype in life (Fig. 3A–D). Based on photographs taken in the field. Dorsal surfaces of body and flanks duff yellow covered, skin spaces between tubercles chocolate brown; supratympanic and canthal stripes chocolate brown; groins and anterior surface of thighs creamy yellow with dark flecks; posterior surfaces of thighs, shanks and tarsus orange yellow, some dark flecks present on posterior surface of thighs; venter creamy yellow covered by dark flecks; chest salmon, throat orange, both suffused with brown flecks; ventral surfaces of thighs, shanks, and tarsus yellow; plantar and palmar surfaces creamy white with dense dark flecks; iris gold with thick black reticulations.

Coloration of holotype in preservative (Fig. 4A–E). Dorsal surfaces of body and flanks dark brown fading lighter at the edge of the flanks and venter; gray supratympanic and canthal stripes; groins, anterior, and posterior surfaces of thighs, shanks and tarsus tan; venter, belly and throat creamy yellow suffused with dark flecks; ventral surfaces of limbs creamy yellow; ventral surfaces of fingers and toes cream.

Variation. Male CORBIDI 26765 (Fig. 5C, D) has a single enlarged lateral tubercle instead of a row of tubercles. Skin on dorsum is smoother in males CORBIDI 26766 (Fig. 5E, F) and 26768 (Fig. 5G, H). Also, the lateral row of enlarged tubercles is shorter in male CORBIDI 26768, reaching only the middle of the flank. Variation in measurements is given in Table 1 and color variation is shown in Fig. 5. Females unknown.

Advertisement call. (Fig. 6) Based on recordings of males CORBIDI 26771 and CORBIDI 26772, the advertisement call consists of one peep-like note (Fig. 6). The average duration of a note is 0.10 s (range 0.06–0.15 s). The fundamental and dominant frequencies of the notes are on average 2200.54 Hz (range 2191.00–2209.82 Hz), without frequency modulation. Descriptive statistics for bioacoustic variables are shown in Table 2.

Distribution, natural history and conservation status. *Pristimantis chinguelas* sp. nov. is only known from the type locality, in Cerro Chinguelas, at 2849 m a.s.l. The type locality is a steep, rocky, open area on the cliff side of the Sapalache – El Carmen road (Fig. 7A). The vegetation here consists of scattered bushes, montane bamboo (*Chusquea* spp), some herbs and grass. All individuals were collected at night, calling on leaves, up to 1.8 m. Air temperature was 10 °C and the humidity was 98%. During our fieldwork, we heard at least two more groups of calling males, in a steeper area, no more than 100 meters away from the type locality. No other amphibian was recorded in sympatry with the new species. Based on our field data, we estimate the area of occupancy of this species is less than 10 km². Nevertheless, the species might occupy adjacent unexplored areas. Information on its population size is unknown. In view of the scarcity of information, and according to the IUCN Red List guidelines (IUCN, 2019) we suggest that *P. chinguelas* sp. nov. be included in the Data Deficient (DD) category.

Etymology. The specific epithet is a noun in apposition. It refers to the type locality of the new species, Cerro Chinguelas, a place where a handful of explorers in the late 70's started the scientific research in the Cordillera de Huancabamba.

Pristimantis nunezcortez sp. nov.

<https://zoobank.org/DA90D07D-1B74-476D-B0FB-6D421A00B935>

Type material. Holotype • Adult male CORBIDI 26786 (Figs 8A–D, 9A–E), from Cerro Chinguelas, Huancabamba Province, Piura Region, Peru (5°7'8.15"S, 79°22'2.19"W; 2593 m a.s.l.) collected on 10 November 2023 by Karen Y. Victoriano-Cigüeñas, Ivan Wong, and Germán Chávez.

Paratype • Adult male CORBIDI 26785 (Fig. 10A, B), same data as holotype.

Diagnosis. We placed *Pristimantis nunezcortez* sp. nov. in the genus *Pristimantis* sensu Hedges et al. (2008); Duellman and Lehr (2009) and Padial et al. (2014), subgenus *Huicundomantis* (sensu Ortega et al. 2022). *Pristimantis nunezcortez* sp. nov. is a medium-sized species distinguished by the following combination of traits: (1) skin on dorsum finely shagreened without conspicuous crests, folds or ridges on scapular region; skin on venter coarsely areolate; discoidal fold evident, thoracic fold present; dorsolateral folds absent; flanks areolate; skin on dorsal surfaces of limbs smooth with low rounded tubercles; (2) tympanic membrane present, tympanic annulus present,

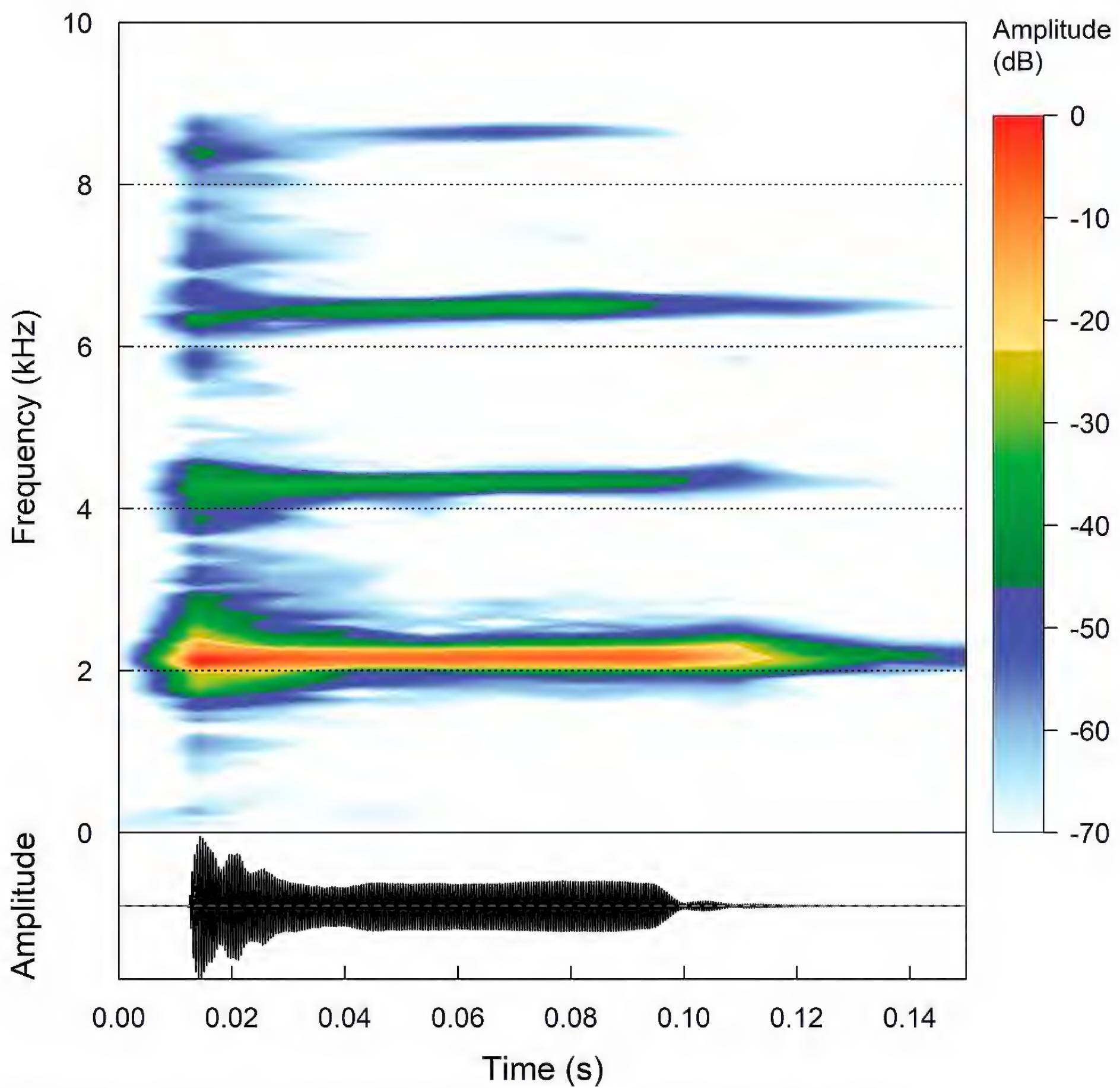


Figure 6. Advertisement call of *Pristimantis chinguelas* sp. nov. Oscillogram shown below spectrogram.

Table 2. Descriptive statistics of call parameters of *P. chinguelas*. Mean $\pm$ SD and range in parentheses. n = number of recordings/calls.

Call parameters	Mean $\pm$ SD	Range
Notes per call n = 3/12	1 $\pm$ 0.00	-
No. harmonics n = 3/12	-	(4–9)
Note length (s) n = 3/12	0.10 $\pm$ 0.03	(0.06–0.15)
Inter-note length (s)	-	-
Inter-call length (s) n = 1/4	15.97 $\pm$ 2.37	(13.96–18.58)
Dominant frequency (Hz) n = 3/12	2200.54 $\pm$ 6.08	(2191.00–2209.82)
Initial frequency (Hz) n = 3/12	2208.69 $\pm$ 27.96	(2196.39–2296.88)
Final frequency (Hz) n = 3/12	2208.06 $\pm$ 23.64	(2196.39–2282.52)
Delta Frequency (Hz) n = 3/12	-18.48 $\pm$ 357.50	(-943.16–721.38)
2 nd harmonic frequency (Hz) n = 3/12	4286.28 $\pm$ 92.24	(4138.39–4410.51)

its length about 42% of the length of eye; supratympanic fold evident going from the posterior edge of the orbit to the level of the insertion of forelimbs; (3) snout short,

subacuminate in dorsal view, rounded in profile; canthus rostralis straight; (4) upper eyelid lacking tubercles, about 50% IOD in males, females unknown; (5) dentigerous processes of vomers present, low, triangular, moderately separated, posteromedial to choanae; (6) males having vocal slits; (7) Finger I slightly shorter than Finger II (Fig. 9C); discs on fingers broadly expanded except in finger I, elliptical; (8) fingers lacking lateral fringes; (9) ulnar tubercles rounded, low; (10) heel bearing one conical tubercle, tarsus having low rounded tubercles; (11) inner metatarsal tubercle elliptical, elevated, about 4 times the size of round outer metatarsal tubercle; supernumerary tubercles prominent; (12) toes with lateral fringes; basal webbing on feet; Toe V longer than Toe III (disc on Toe III reaches distal edge of the penultimate subarticular tubercle on Toe IV, disc on Toe V reaches the proximal edge of the distal subarticular tubercle on Toe IV) (Fig. 9D); (13) in life, dorsum yellowish brown to reddish brown, minute



Figure 7. Habitat in the localities inhabited by the new species described herein. **A.** Habitat in the type locality of *P. chinguelas* sp. nov.; **B.** Stream where we found *P. nunezcortezi* sp. nov.; **C.** Primary forest in the type locality of *P. yonke* sp. nov.; **D.** Panoramic view of the primary forest in the type locality of *P. yonke* sp. nov.

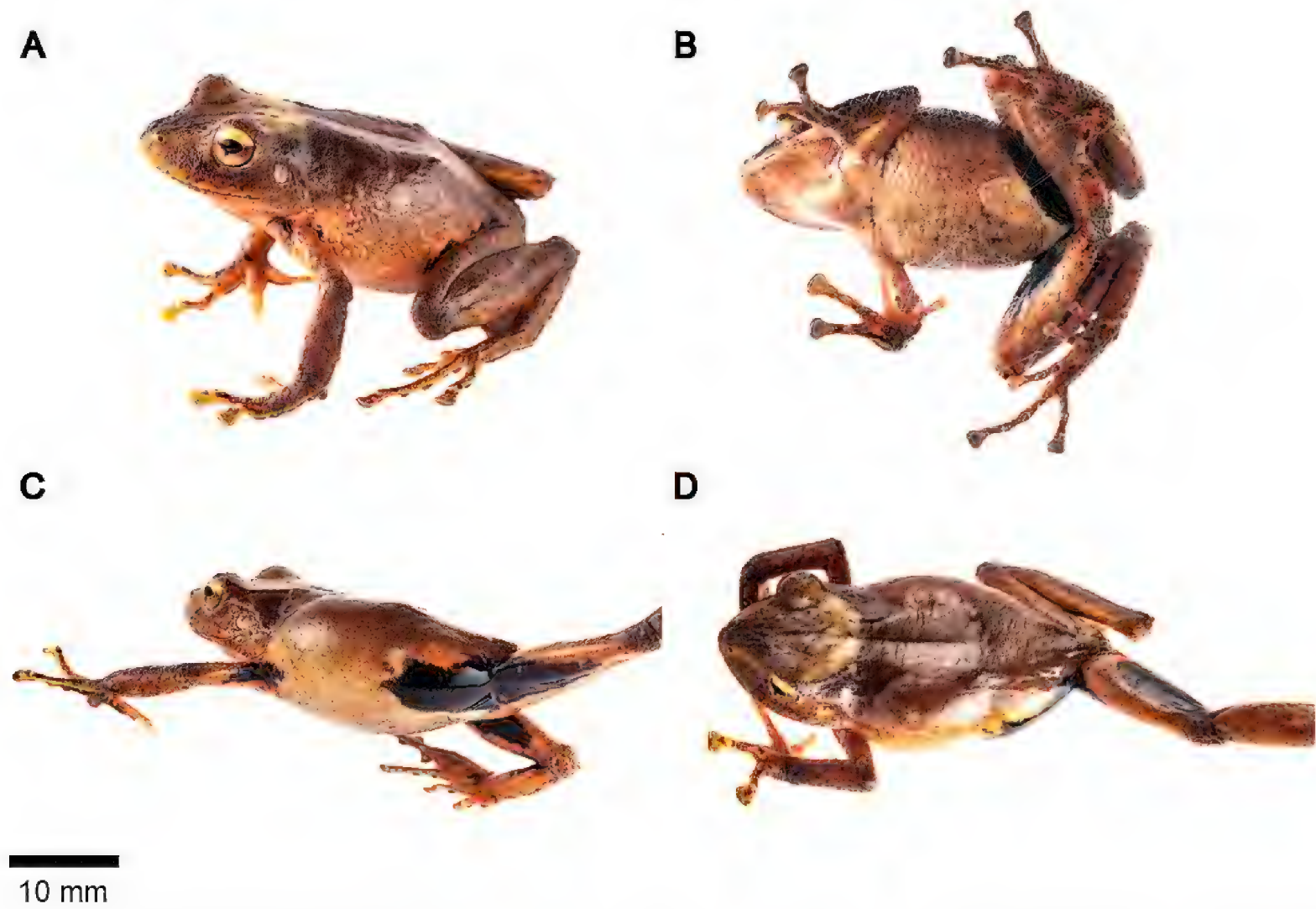


Figure 8. Dorsolateral (**A**), ventral (**B**), lateral (**C**), and dorsal (**D**) view of the holotype (CORBIDI 26786) of *Pristimantis nunezcortezi* sp. nov. in life.

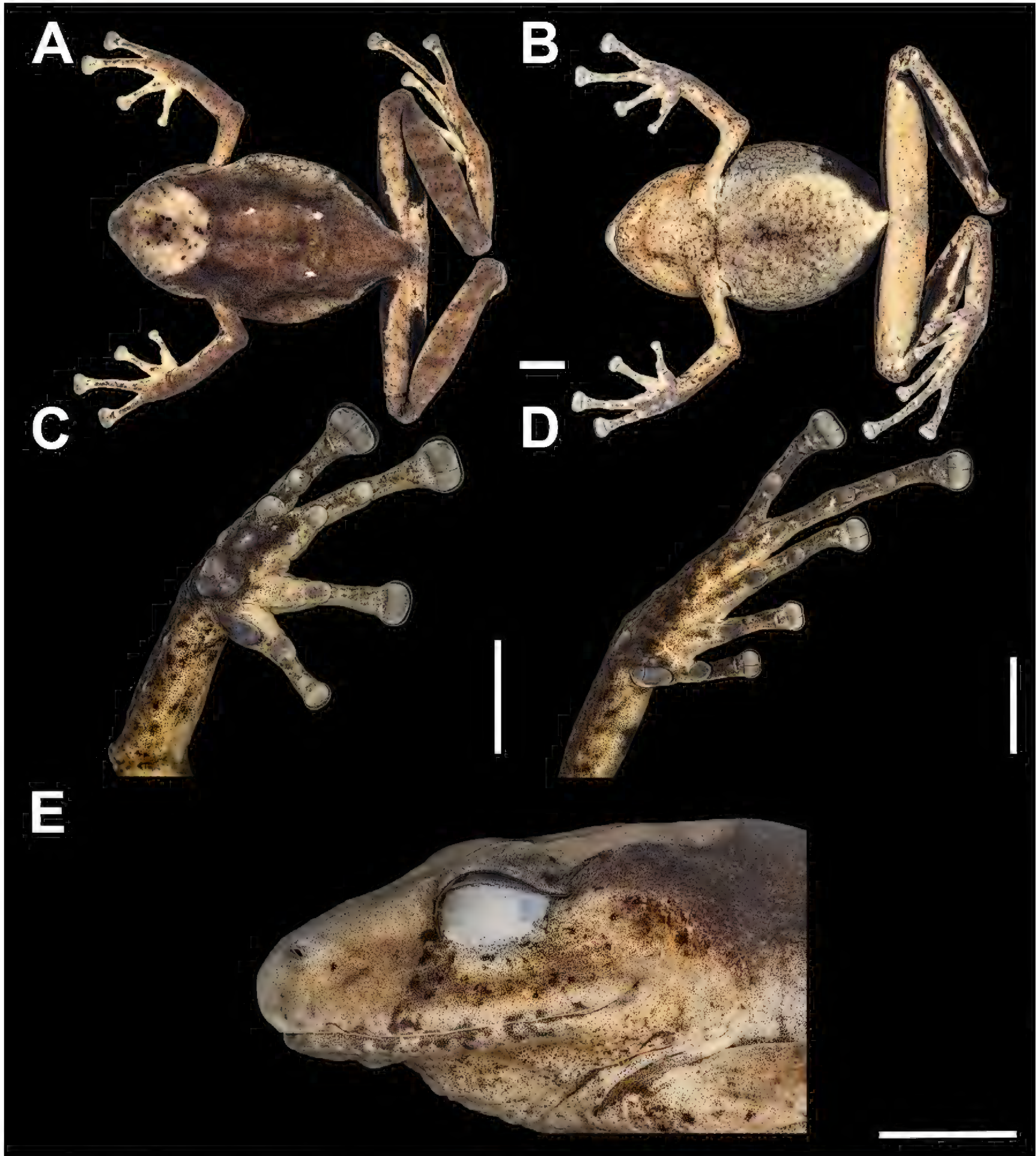


Figure 9. Holotype of *Pristimantis nunezcortezi* sp. nov. in preservative (CORBIDI 26786). **A.** Dorsal; **B.** Ventral view of the body; **C.** Ventral view of the right hand; **D.** Ventral view of the right foot; **E.** Lateral view of the head. Scale bars: 5 mm.

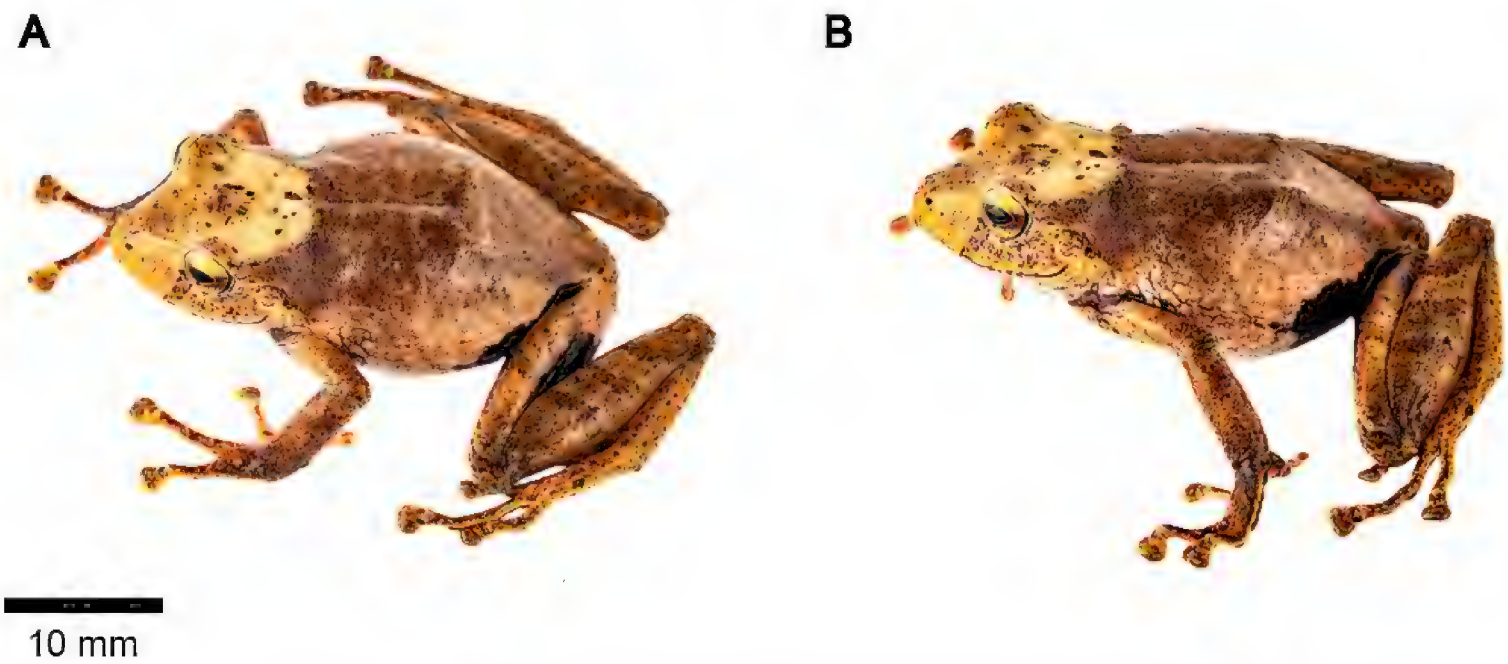


Figure 10. Dorsal (**A**) and dorsolateral (**B**) view of *Pristimantis nunezcortezi* paratype (CORBIDI 26785) in life.

red speckles are visible; light yellow trapezoidal mark on the occipital-scapula region; groins, axillae and posterior surface of thighs having orange-pink bordered black blotches; venter chrome orange; iris gold to orange-yellow on the upper half, copper to scarlet red on the lower half with thin dark reticulations (Figs 8A, 10B); (14) SVL of two adult males 31.7 and 38.0 mm; females: unknown.

Comparisons. *Pristimantis nunezcortez* sp. nov. looks similar to *P. cryptomelas*, but can be differentiated by (conditions for *P. cryptomelas* in parenthesis) lacking conspicuous occipital-scapular folds or ridges (vs present), lacking tubercles on the upper eyelid (vs two or three large tubercles present), skin on flanks areolate (vs shagreen), and by having one low conical tubercle on heels (vs bearing one large conical and several small rounded tubercles). Also, *P. nunezcortez* shares with *P. aaptus*, *P. coronatus*, *P. atrabracus*, and *P. melanogaster* a black coloration on groins. Nevertheless, *P. nunezcortez* is easily distinguished by lacking interorbital bar and transversal bars on limbs (vs present in *P. aaptus*), having the skin on the upper eyelid shagreen (vs smooth in *P. aaptus*, tuberculate in *P. coronatus*), tympanic annulus and tympanic membrane evident (vs absent in *P. coronatus*, tympanic annulus absent in *P. aaptus*), toe V longer than toe III (vs toe V shorter than toe III in *P. atrabracus* and *P. melanogaster*), and disc on fingers and toes I and II narrower than rest of fingers and toes (vs discs on fingers and toes uniformly narrow). Additionally, it differs from all members of the *P. cryptomelas* group (*sensu* Páez and Ron 2019) by lacking postocular ridges and prominent tubercles (vs postocular ridges or folds, and prominent tubercles on upper eyelid, heels and tarsus present in all species of this group).

Description of the holotype. An adult male (CORBIDI 26786). Measurements (in mm): SVL 38.0; TL 21.8; FL 20.7; HL 14.2; HW 15.7; ED 4.2; TD 2.0; IOD 5.5; EW 2.9; IND 3.1; EN 4.9; FeL 19.2. Head wider than long, narrower than body; snout subacuminate in dorsal view, rounded in profile, lacking papilla or flaps on the tip of the snout (Fig. 9E); cranial crests absent; nostrils low, directed anterolaterally; canthus rostralis straight in dorsal view, rounded in cross section; loreal region concave; upper eyelid lacking tubercles; tympanic annulus present, visible through the skin, its upper and posterolateral edge concealed by a thick supratympanic fold; tympanic membrane visible; postrictal tubercles absent. Choanae median, ovoid, non-concealed by palatal shelf of maxilla; dentigerous processes of vomers present, triangular, moderately separated, posteromedial to choanae; tongue slightly longer than wide, not notched, posterior half free; vocal slits slightly curved, positioned at posterior half of mouth floor in between tongue and margin of jaw; vocal sac size unknown. Dorsal surfaces of body finely shagreen; skin on flanks areolate; skin on dorsal surface of limbs shagreened bearing low, rounded tubercles; skin on belly coarsely areolate, that on throat weakly areolate, ventral surfaces of limbs areolate, ventral surfaces of thighs coarsely areolate; discoidal fold present, thoracic fold prominent. Ulnar tubercles low, rounded; nuptial

pads present; outer palmar tubercle slightly bifid low, as large as ovoid thenar tubercle; subarticular tubercles low, rounded; large, prominent supernumerary tubercles at base of fingers; fingers lacking lateral fringes; Finger I slightly shorter than Finger II; discs on fingers expanded and rounded; pads on fingers surrounded by circumferential grooves on all fingers (Fig. 9C). Hindlimbs slender; dorsal surfaces of hindlimbs shagreen; posterior surfaces of thighs smooth, ventral surfaces of thighs coarsely areolate; heel having a low conical tubercle; outer edge of tarsus bearing low, rounded tubercles; inner metatarsal tubercle elliptical, elevated, three times the size of oval outer metatarsal tubercle; plantar surface with small, low and rounded supernumerary tubercles; subarticular tubercles prominent, rounded; toes bearing lateral fringes; basal webbing between all toes; discs on toes smaller than those on fingers, expanded and rounded; all toes having pads surrounded by circumferential grooves; relative lengths of toes: $I < II < III < V < IV$; Toe V longer than Toe III (disc on Toe III reaches the distal edge of penultimate subarticular tubercle on Toe IV, disc on Toe V reaches the proximal edge of distal subarticular tubercle on Toe IV; (Fig. 9D).

Coloration of holotype in life. Based on photographs taken in the field. Dorsal surfaces of body reddish brown, areolate areas on flanks orange, minute red speckles on all dorsum; canthal area yellowish brown; groins, anterior and posterior surface of thighs, and posterior surface of shanks having large orange bordered black blotches; dorsal surfaces of limbs reddish brown; throat, chest, belly and ventral surface of hind limbs chrome orange; plantar and palmar surfaces reddish brown with small black blotches; iris with fine black reticulations, gold on the upper half, copper on the lower half (Fig. 8 A–D).

Coloration of holotype in preservative. Dorsal surfaces of body and flanks dark brown fading lighter at the edge of the flanks and venter; groins, anterior, and posterior surfaces of thighs, and shanks black; throat and chest yellow; belly creamy yellow suffused with dark flecks; ventral surfaces of limbs creamy yellow with gray blotches; ventral surfaces of fingers and toes creamy yellow with gray blotches (Fig. 9A–E).

Variation. Measurement's variation is given in table 1 and color variation in the paratype CORBIDI 26785 is shown in fig. 10.

Distribution, natural history and conservation status. This species is only known from the type locality on the eastern slope of Cerro Chinguelas (Fig. 1), in a small rocky stream (Fig. 7B) that crosses the Sapalache – El Carmen road, at 2,593 m a.s.l. The streambed can be walked from the road for 200 meters until a rocky wall that blocks access upstream. The habitat is a secondary forest with trees up to 15 m tall, scattered shrubs, tree ferns, bromeliads and herbaceous plants. The soil is wet, covered by leaf litter and some fallen trunks, fungi colonies and lichens. Also, we noticed the presence of farms around this stream. Both individuals CORBIDI 26785 and CORBIDI 26786 were observed at night, during the rainy season, perched

on leaves, about 1.8–2 m from the ground. No calls were recorded. In addition, we observed *P. galdi* and *P. muscosus* in sympatry with the new species. *Pristimantis nunez-cortez* sp. nov. has presumably a small distribution range, its area of occupancy is far less than 10 km² and is only known for a single locality. Since we only recorded two individuals, the species' distribution extension, population size and conservation status are unknown. Therefore, according to the IUCN Red List guidelines (IUCN, 2019) we suggest that this species should be placed in the Data Deficient (DD) category of the IUCN Red List.

Etymology. the specific epithet, is a patronym for Elio Nuñez-Cortez, a Peruvian ornithologist, in recognition for his contribution to the conservation of the Cordillera de Huancabamba, and for his valuable support and guidance in every one of the expeditions performed by this team. The species epithet is formed from the combination of words of the last name “Nuñez-Cortez” as a noun in the genitive case, with the latin suffix “i”.

***Pristimantis yonke* sp. nov.**

<https://zoobank.org/B39FEFF3-D3FB-487D-B198-1CF8551ECF5D>

Type material. *Holotype* • Adult male CORBIDI 26399 (Figs 11A–D, 12A–E) from Laguna Negra trail, Ayabaca Province, Piura Region, Peru (4°55'52.58"S, 79°29'8.41"W; 2933 m a.s.l.) collected on 6 September 2023 by Juan D. Valencia-Málaga and Germán Chávez.

Paratypes • Adult female CORBIDI 26398, male CORBIDI 26402 collected with the holotype, • adult males CORBIDI 26413–14 collected at the type locality on 9 and 10 September 2023, respectively by Juan D. Valencia-Málaga, and Germán Chávez. • Adult female CORBIDI 26929 from Bosque de Ramos, Ayabaca Province, Piura Region, Peru (4°42'25.75"S, 79°27'51.24"W; 2949 m a.s.l.), collected on 9 July 2024 by Wilmar Aznaran, Karen Y. Victoriano-Cigüeñas, Jesús R. Ormeño, Ronal Sumiano-Mejía, and Germán Chávez (Fig. 13A–H).

Referred specimens. Juvenile CORBIDI 26403 from the type locality; juveniles CORBIDI 26924–25 from Bosque de Ramos, Ayabaca Province, Piura Region, Peru (4°42'25.75"S, 79°27'51.24"W; 2949 m a.s.l.), collected on 9 July 2024 by Wilmar Aznaran, Karen Y. Victoriano-Cigüeñas, Jesús Ormeño-Benavides, Ronal Sumiano-Mejía, and Germán Chávez.

Diagnosis. *Pristimantis yonke* sp. nov. is a small species with broad flat head, which may be distinguished by the following combination of traits: (1) skin on dorsum finely tuberculate without crests or ridges on scapular region, incomplete and low dorsolateral fold occasionally present; skin on venter areolate; discoidal fold present; thoracic fold absent; skin on flanks as on dorsum; longitudinal middorsal fold evident; (2) tympanic membrane and tympanic annulus evident, its length about 50% of the length of eye; supratympanic fold present, going from the distal edge of tympanum to the level of the insertion of forelimbs; (3) snout short, dorsoventrally compressed,

acuminate in dorsal view, protruding and inclined posteroventrally in profile, rostral papillae present; canthus rostralis concave; (4) upper eyelid having small, low rounded tubercles, about 70% IOD in males, 50% in females; cranial crests absent; (5) dentigerous processes of vomers absent; (6) males with a subgular vocal sac and vocal slits; (7) Finger I slightly shorter than Finger II; discs on fingers broadly expanded, elliptical (Fig. 12C); (8) fingers having lateral fringes; (9) ulnar tubercles absent; (10) heel and tarsus lacking conical tubercles, only low rounded tubercles present; (11) inner metatarsal tubercle elliptical, elevated, about 3 times the size of round outer metatarsal tubercle; supernumerary tubercles low; (12) toes with lateral fringes; basal webbing on feet; Toe V longer than Toe III (disc on Toe III slightly surpasses distal edge of the penultimate subarticular tubercle on Toe IV, disc on Toe V clearly surpasses the distal edge of the distal subarticular tubercle on Toe IV) (Fig. 12D); (13) in life, dorsum dark brown to cinnamon brown, with or without dark blotches; flanks same color as dorsum; head having dark supratympanic fold, pale interorbital bar occasionally present; groins, axillae and posterior surface of thighs creamy white to dark brown with or without yellow mottling; throat cream, creamy yellow or yellow with or without dark brown reticulations; belly creamy white or creamy yellow with dark dots, ventral surfaces of thighs yellowish pink or yellow with dark dots; iris gold with thin black reticulations, and a broad horizontal reddish brown streak (Fig. 11A–D); (14) average SVL in adult males: 19.6 ± 0.3 mm (19.3–20.1 mm; $n = 4$); in females: 30.6 ± 2.4 mm (28.9–32.3 mm; $n = 2$).

Comparisons. *Pristimantis yonke* sp. nov. is closely related, and also similar in appearance, to *P. morlaco* Sánchez-Nivicela, Toral-Contreras and Urgiles 2022, however, the new species can be differentiated by having an acuminate snout from dorsal view (vs subacuminate), inclined posteroventrally from profile (vs acuminate), palmar tubercle oval (vs “U” shaped), lacking dentigerous processes of vomers (vs present, oblique) and males being smaller with a SVL of 19.3–20.1 mm (vs 24.1–26.6 mm). The new species shares with members of the *P. lacrimosus* group (Duellman and Lehr 2009; Rivera-Correa and Daza 2020; Carrión-Olmedo and Ron 2021; Castillo-Urbina et al. 2023) and members of the *P. colodactylus* subgroup (Székely et al. 2016) the dorsoventrally compressed body and the flat, broad, pointed head. From members of the *P. lacrimosus* group, *Pristimantis yonke* sp. nov. can be easily distinguished by having a dorsum predominantly brown (vs olive green, green, yellow, gold or orange in *P. achupalla*, *P. acuminatus*, *P. bromeliaceus*, *P. ecuadoriensis*, *P. enigmaticus*, *P. eremitus*, *P. galdi*, *P. jorgevelosai*, *P. lacrimosus*, *P. latericius*, *P. limoncochensis*, *P. loeslein*, *P. mendax*, *P. moro*, *P. nankints*, *P. olivaceus*, *P. omeviridis*, *P. ornatissimus*, *P. padiali*, *P. pardalinus*, *P. petersi*, *P. petersioides*, *P. pseudoacuminatus*, *P. rhodoplichus*, *P. romeroae*, *P. royi*, *P. schultei*, *P. tantanti*, *P. tayrona*, *P. urani*, *P. waoranii*, and *P. zorro*). Only *P. amaguanae*, *P. aureolineatus*,

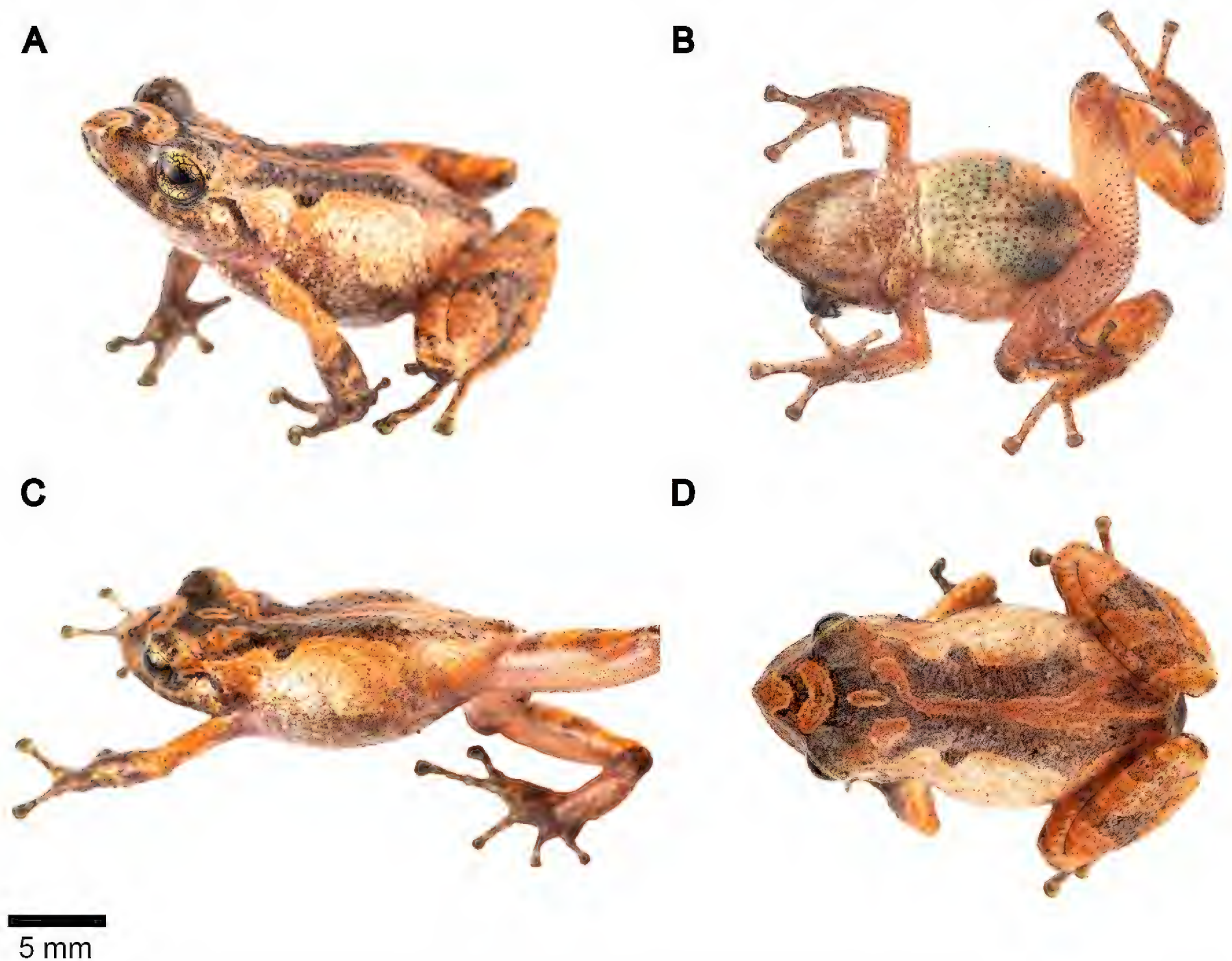


Figure 11. Dorsolateral (A), ventral (B), lateral (C), and dorsal (D) view of the holotype (CORBIDI 26399) of *Pristimantis yonke* sp. nov. in life.

P. mindo, *P. nyctophylax*, *P. pluvialis*, *P. pulchridormientes*, *P. subsigillatus* and *P. zimmermanae* have a brown dorsum among their color patterns, but the new species is distinguishable by having a snout protruding in profile (vs acuminate in *P. nyctophylax* and *P. zimmermanae*, rounded in *P. mindo* and *P. pluvialis*), having a rostral papillae on the tip of the snout (vs absent in *P. aureolineatus*, *P. mindo*, *P. nyctophylax*, *P. pulchridormientes*, and *P. subsigillatus*), having skin on dorsum finely tuberculate (vs. shagreen in *P. amaguanae*, *P. aureolineatus*, and *P. pulchridormientes*; smooth in *P. mindo*, *P. pluvialis*, *P. subsigillatus*, and *P. zimmermanae*), lacking vomerine teeth (vs present in *P. aureolineatus*, *P. mindo*, *P. nyctophylax*, and *P. subsigillatus*), and lacking conical tubercles (vs present on heels in *P. amaguanae*, *P. nyctophylax*, and *P. subsigillatus*). From members of the *P. colodactylus* subgroup, *P. yonke* may be differentiated by the combination of the following features (characters for other species in parenthesis): having an average SVL of 20.7 mm in males and 30.6 mm in adult females (vs 16.9 mm in males and 20.3 in females of *P. colodactylus*, 20.4 mm in males and 22.5 in females of *P. matildae*, 16.8 mm in males and 22.1 in females of *P. muranunka*), snout acuminate in dorsal view (vs rounded in *P. muranunka*), skin on dorsum

tuberculate (vs areolate in *P. colodactylus*), longitudinal middorsal fold present (vs absent in *P. colodactylus* and *P. muranunka*), tympanic membrane and annulus present (vs absent in *P. colodactylus* and *P. matildae*), conical tubercles on upper eyelid and heels absent (vs present in *P. matildae*), larger feet size being about 44% of the SVL (vs 36% of SVL in *P. colodactylus*, 38% of SVL in *P. muranunka*, 40% in *P. matildae*), and iris coloration gold (vs bronze in *P. colodactylus*, reddish bronze in *P. matildae* and *P. muranunka*). Moreover, *Pristimantis yonke* is genetically related to *Pristimantis* cf. *cajamarcensis* (KU 217845). But it can be distinguished by being smaller, with males reaching up to 20.1 mm of SVL (vs males up to 24.1 mm of SVL in *P. cf. cajamarcensis*), having dorsum tuberculate (vs shagreen in *P. cajamarcensis*), lacking dentigerous processes of vomers (vs present in *P. cf. cajamarcensis*), and lacking red or orange blotches on groins and posterior surface of thighs (vs present in *Pristimantis* cf. *cajamarcensis*, sensu Lynch 1979).

Description of the holotype. An adult male (CORBIDI 26399). Measurements (in mm): SVL 19.63; TL 10.2; FL 8.6; HL 7.3; HW 7.7; ED 2.6; TD 1.2; IOD 2.6; EW 1.9; IND 1.4; EN 2.4; FeL 9.5. Head wider than long, narrower than body; snout acuminate in dorsal view,

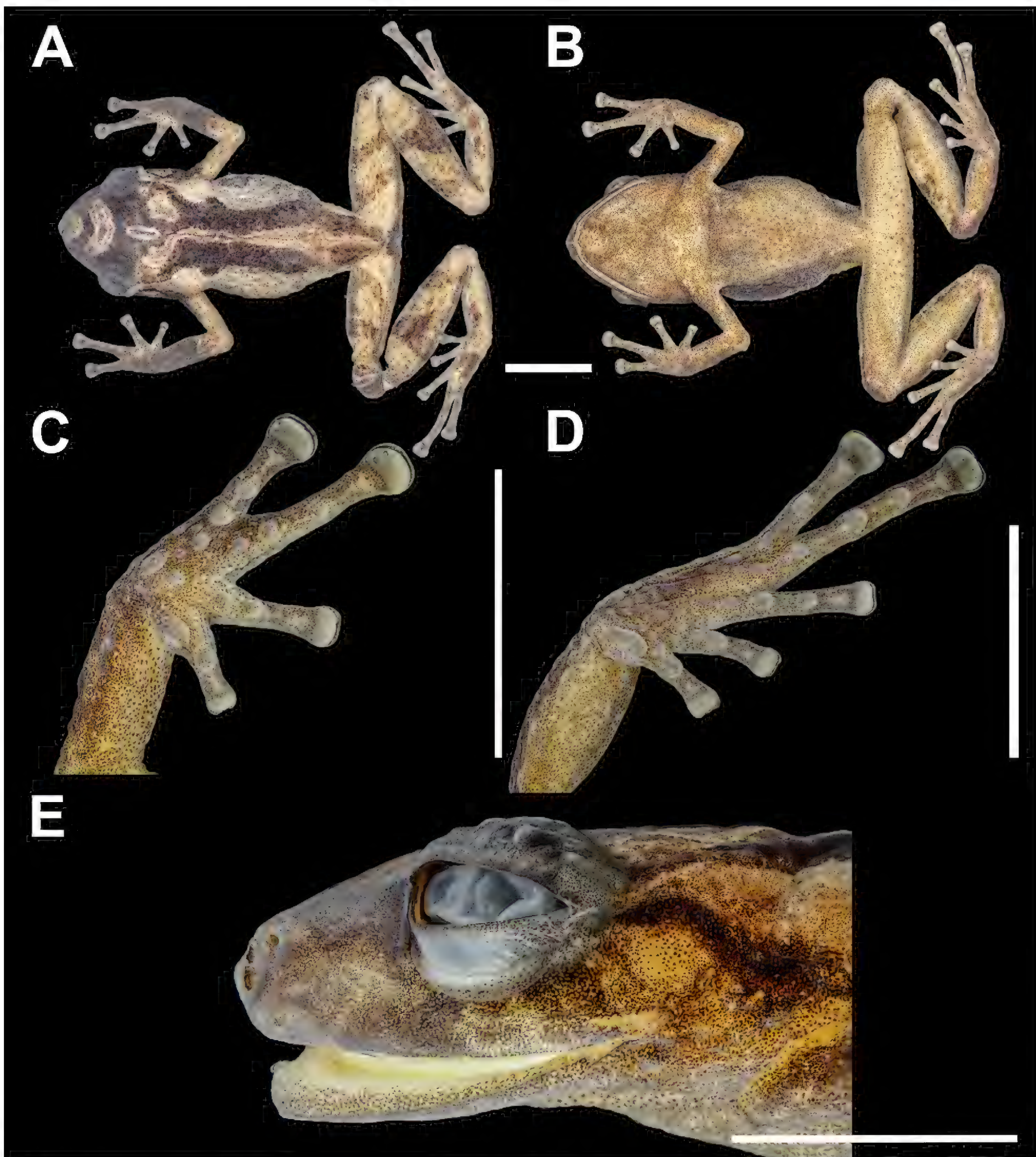


Figure 12. Holotype of *Pristimantis yonke* sp. nov. in preservative (CORBIDI 26399). **A.** Dorsal; **B.** Ventral view of the body; **C.** Ventral view of the right hand; **D.** Ventral view of the right foot; **E.** Lateral view of the head. Scale bars: 5 mm.

protruding in profile, having a rostral papilla on the tip of the snout (Fig. 12E); cranial crests absent; nostrils slightly protuberant, directed anterolaterally; canthus rostralis slightly concave in dorsal view, rounded in cross section; loreal region slightly concave; upper eyelid lacking conical tubercles, only small rounded present; tympanic annulus present, visible through the skin, its upper and posterolateral edge concealed by supratympanic fold; tympanic membrane visible; postrictal tubercles absent. Choanae median, ovoid, non-concealed by palatal shelf of maxilla; dentigerous processes of vomers absent;

tongue slightly longer than wide, not notched, posterior half free; vocal slits slightly curved, positioned at posterior half of mouth floor in between tongue and margin of jaw; medium sized vocal sac. Dorsal surfaces of body and flanks finely tuberculate; skin on chest and belly areolate, that on throat shagreen, ventral surfaces of limbs shagreen, ventral surfaces of thighs coarsely areolate; discoidal fold present, thoracic fold absent. Ulnar tubercles absent; nuptial pads absent; outer palmar tubercle ovoid low, as large as ovoid thenar tubercle; subarticular tubercles low, rounded; large supernumerary tubercles at base

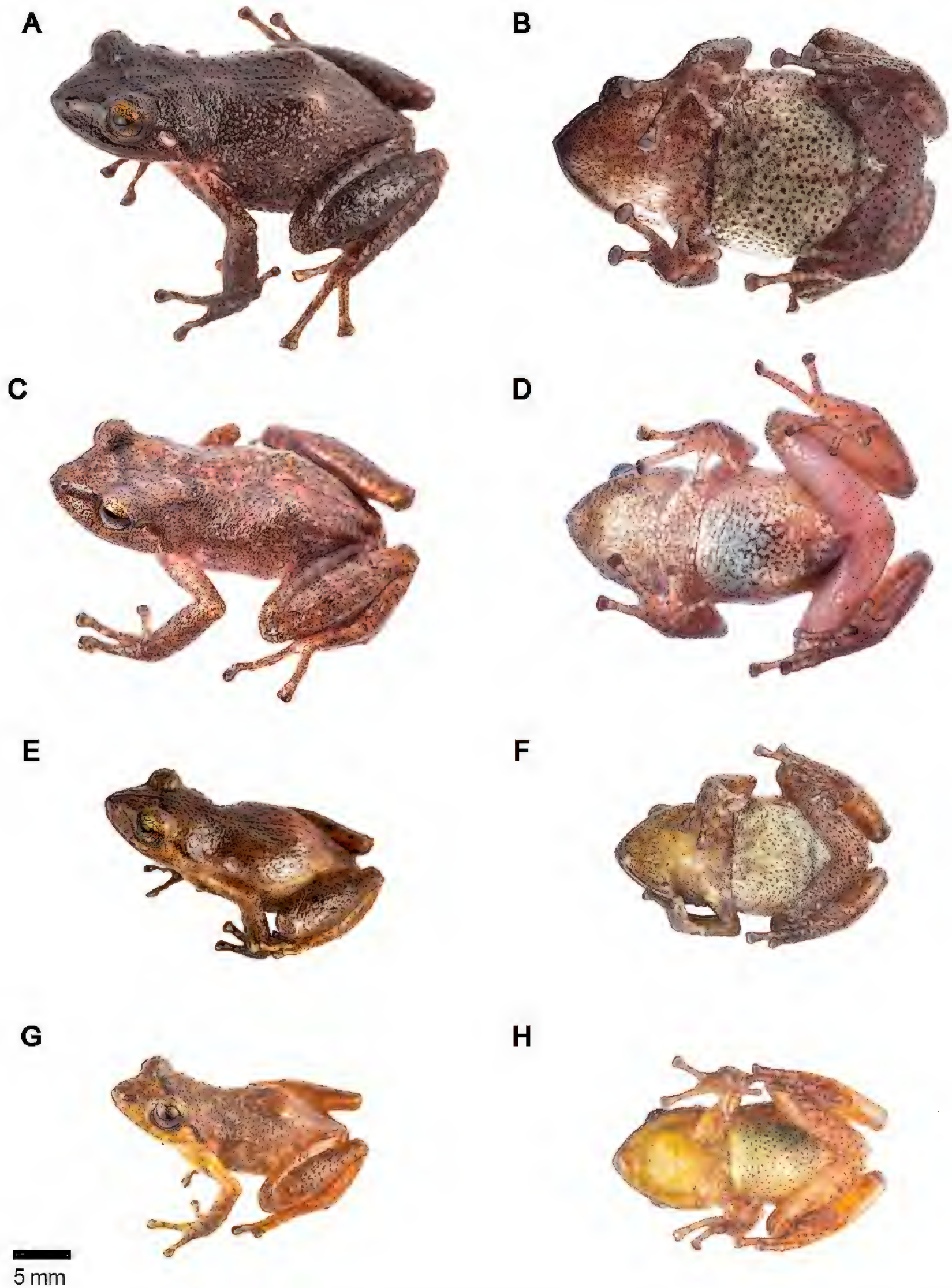


Figure 13. Coloration in life of *Pristimantis yonke* paratypes. **A, B.** CORBIDI 26398, adult female; **C, D.** CORBIDI 26929, adult female; **E, F.** CORBIDI 26414, adult male; **G, H.** CORBIDI 26402, adult male.

of fingers, distinct; fingers bearing lateral fringes; Finger I shorter than Finger II; discs on fingers expanded and rounded; pads on fingers surrounded by circumferential grooves on all fingers (Fig. 12C). Hindlimbs slender; dorsal surfaces of hindlimbs finely tuberculate; posterior surfaces of thighs smooth, ventral surfaces of thighs coarsely areolate; heel bearing low rounded tubercle; outer and inner edge of tarsus lacking tubercles; inner metatarsal

tubercle elliptical, elevated, $1.5 \times$ the size of oval outer metatarsal tubercle; plantar surface with small, low and rounded supernumerary tubercles; subarticular tubercles prominent, rounded; toes bearing lateral fringes; basal webbing between toes III and IV, and IV and V; discs on toes slightly smaller than those on fingers, expanded and rounded; all toes having pads surrounded by circumferential grooves; relative lengths of toes: $I < II < III < V < IV$;

Toe V longer than Toe III (disc on Toe III reaches the distal edge of penultimate subarticular tubercle on Toe IV, disc on Toe V barely reaches the distal edge of distal subarticular tubercle on Toe IV); (Fig. 12D).

Coloration of holotype in life. Based on photographs taken in the field. Dorsal surfaces of body and flanks cinnamon brown, two dark brown dorsal stripes that start at dorsal surface of the head, one of them going beyond the level of groins, the other is discontinuous at the level of the groins; supratympanic stripe chocolate brown, canthal area cinnamon brown with irregular pale brown blotches, upper eyelids dark brown; groins and anterior surface of thighs cream; posterior surfaces of thighs, shanks and tarsus cream, some dark brown flecks present on posterior surface of thighs; venter creamy yellow covered by dark spots; chest and throat yellow, both suffused with brown reticulation; ventral surfaces of thighs pinkish yellow with dark spots, shanks and tarsus light yellow; plantar and palmar surfaces light yellow with dense dark brown flecks; iris gold with thick black reticulations and a broad transversal bronze streak (Fig. 11A–D).

Coloration of holotype in preservative. Dorsal surfaces of body and flanks grayish yellow with two dark dorsal stripes that start at the level of the orbits, extending beyond the level of groins; supratympanic stripe gray; groins, anterior, and posterior surfaces of thighs, shanks and tarsus cream; venter, belly and throat creamy yellow suffused with dark flecks; ventral surfaces of limbs creamy yellow; ventral surfaces of fingers and toes gray (Fig. 12A–E).

Variation. Females CORBIDI 26398 and CORBIDI 26929 have a more tubercled dorsal skin, with higher tubercles than rest of the type series. Tympanic annulus is prominent in females CORBIDI 26398, 26929, less visible in males CORBIDI 26399, 26402, 26413–14. Supratympanic fold is barely pigmented in female CORBIDI 26929. Middorsal fold is barely visible in male CORBIDI 26402. Variation in measurements is given in table 1 and color variation is shown in Fig. 13.

Distribution, natural history and conservation status. This species is known from two localities on the western slopes of the Cordillera de Huancabamba: Laguna Negra trail and Bosque de Ramos, which are 28.8 km (airline) apart, at 2949 and 3000 m a.s.l. respectively (Fig. 1). All individuals were found in primary montane forests where arboreal vegetation consists of *Myrcianthes* sp. and *Podocarpus* sp., both trees that reach up to 15 m high. Tree trunks are usually covered with lichens, mosses, and some epiphytic bromeliads. Also, we observed scattered bushes and small clearings inside the forest (Fig. 7C, D). The soil is wet, muddy in some sections and partially covered by leaf litter. All individuals were found at night, inside bromeliads (1–3 m from the ground). Bromeliads where we found CORBIDI 26398–99, 26403, 26413–14 were close to a rocky stream, whereas CORBIDI 26929 was caught inside a bromeliad in the middle of the forest, without water bodies nearby. Our collections were made during the dry season, and no calling activity was recorded. In addition, we observed *P. rhodoplichus* in sympatry

with *P. yonke* sp. nov. Based on the extension of our night walks, the sum of the area of occupation in the two localities where we found *P. yonke* sp. nov. is less than 10 km². However, the surroundings remain unexplored, so we do not have accurate information about its geographic distribution, nor about its population size. We suggest that further surveys in the area are needed to collect additional data and assign the species to some threat category. Therefore, following the IUCN guidelines (IUCN, 2019), we suggest this species should be included in the Data Deficient (DD) category of the IUCN Red List.

Remarks. Despite its similar appearance (presence of rostral papillae, acuminate snout profile, distinct tympanic membrane, moderately long limbs, Finger I shorter than Finger II, and expanded digital discs), we do not allocate *Pristimantis yonke* sp. nov. into the putative *P. lacrimosus* group sensu Arteaga-Navarro et al. (2013) and Carrión-Olmedo and Ron (2021) because of phylogenetic evidence.

Etymology. The specific epithet is a noun in apposition. It refers to the traditional drink “yonke” or “yonque”, which is obtained from sugar cane distillation and only drunk by local people from northwestern Andes to keep themselves warm during their journeys through the cold highlands, which may include night camps to get to other villages.

Discussion

Previous studies have largely demonstrated that external morphology in strabomantid frogs may be insufficient to solve taxonomic issues confidently (Hedges et al 2008; Padial et al. 2009; Padial et al. 2012). That is why we use an integrative approach to describe the three new species, specifically providing morphological, phylogenetic and, for one species, bioacoustic support. Therefore, we are very confident that our results show the actual taxonomic relationship between the three new species and their congeners.

Cryptic diversity of the *Pristimantis phoxocephalus* group (*Huicundomantis* subgenus) was noticed by Páez and Ron (2019), who stated that several undescribed species along *Huicundomantis* distribution may be still hidden under the name *P. phoxocephalus*. Here, we describe at least one of them from the Peruvian side of the Cordillera de Huancabamba: *Pristimantis chinguelas*. Our phylogenetic analysis shows that this species is confidently placed in a sister clade to one containing *Pristimantis gloria* (KU 218035, MUTPL250, QCAZ 16448) and an undescribed species (QCAZ 45155) both from Ecuador, leaving apart similar-looking species like *P. wagneri* from Peru. Despite their external similarities, *P. chinguelas* and *P. wagneri* are not closely related. As suggested by Padial et al. (2009), body shape and phenotypic characteristics in terrestrial breeding frogs (Strabomantidae) may have been triggered, among other reasons, by evolutionary responses to environmental conditions. Since our study agrees with Páez and Ron (2019), who clarified that *Pristimantis phoxocephalus* is restricted to Ecuador

and populations from northern Peru belong to different species, we strongly suggest further phylogenetic analyses including mitochondrial and nuclear markers to reach confident conclusions on the taxonomic identity of northern Peru populations formerly assigned to *P. phoxocephalus*, something also suggested by Páez and Ron (2019).

Cryptic diversity is also suspected for the taxon *Pristimantis cryptomelas*. Given the long distance between its type locality and southern populations, Székely et al. (2020) recommended further revisions of populations of *P. cryptomelas* across its distribution range (including southern Ecuador and northern Peru). Indeed, 124 km south from *P. cryptomelas*'s type locality (airline) we found *Pristimantis nunezcortezii*, a closely related species that shares some phenotypic similarities but is mainly differentiable by the absence of prominent postorbital and scapular ridges (vs present in *P. cryptomelas*) and the absence of large tubercles on the upper eyelids and heels (present in *P. cryptomelas*). Although the southern distribution boundary of *P. cryptomelas* remains unknown, so far the southernmost record is an individual of *P. cryptomelas* (showing post orbital ridges) from Rio Blanco, northern Peru (Duellman and Lehr 2009) near the border with Ecuador. This locality is only 30 km apart from the type locality of *P. nunezcortezii*, suggesting they might be sympatric, but further field surveys are needed to confirm this hypothesis.

External appearance in *Pristimantis yonke* sp. nov. is similar to the “Bromeliad morph” of other *Pristimantis*: body dorsoventrally compressed, broad and flattened head (Hedges et al. 2008; Duellman and Lehr 2009; Ron et al. 2020). Indeed, all individuals were found inside bromeliads. Among species of the genus, there are at least four clades containing bromeliad specialists showing this morph: The *P. lacrimosus* group (Hedges et al. 2008; Ron et al. 2020), the *P. colodactylus* subgroup (Székely et al. 2020), the *Huicundomantis* subgenus (sensu Páez and Ron 2019, Ortega et al. 2022) and a clade including *P. cf. cajamarcensis*, *P. ceuthospilus* and *P. morlaco* in the *P. unistrigatus* group (Sánchez-Nivicela et al. 2022). Members of *Huicundomantis* and those in the latter clade have a high variety of phenotypes among its members, instead of the single Bromeliad morph present in all members of the *P. lacrimosus* group and the *P. colodactylus* subgroup. Our phylogeny places *P. yonke* in the latter clade within the *P. unistrigatus* group. As mentioned above, this might suggest a certain level of adaptation playing a role in shaping the external morphology in these *Pristimantis*. Yet, further studies on evolution, divergence time and phylogenetic relationships are needed to determine the time of origin for every morph, other triggers causing their current morphology, and their evolution pathway within the genus. Our analysis also suggests that *Pristimantis cf. cajamarcensis* from Yangana, Loja, Ecuador (KU 217845) a locality 250 km north of the type locality of *P. cajamarcensis* (Pre-Incan ruins near Huambos, Cajamarca, northwestern Peru) is not related to the Peruvian populations of *P. cajamarcensis* (p-distances = 12%–13%) sampled near the type locality (CORBIDI 12788, 24000, 24309). Thus, we suggest that the Ecuadorian populations assigned to *P. cajamarcensis*

should be revised and their phylogenetic relationships be examined to clarify their taxonomic status.

The Cordillera de Huancabamba is an area full of mythology, legends and where people traditionally believe in witchcraft. Besides its rough topography, this mythologic atmosphere has historically discouraged some local people from invading the highlands to use them as pasture for cattle. But more recently, from 2001 to 2023, wildfires, agriculture and cattle ranching have extended their reach, causing the loss of nearly 5000 ha of wild ecosystems, as confirmed by satellite images (Global Forest Watch 2025). Since large wildfires hit the area in November 2024 and no publication has yet quantified the damage, the current habitat destruction in the Cordillera de Huancabamba may be even greater. So far, we have no evidence that burnt areas include the habitat of some of the new species described herein. However, a re-assessment of their populations, particularly after the next dry season (from June to September of 2025) when the occurrence of wildfires increases greatly, should be performed to confirm their conservation status.

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Supplementary material 1

Species vouchers, GenBank accession codes and location of the corresponding new genetic sequences generated in this work

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Data type: xlsx

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